

The Aviation Historian[®]

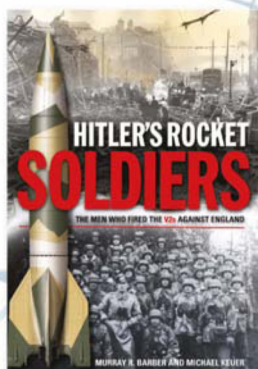
The modern journal of classic aeroplanes and the history of flying

the ultimate
power struggle?

handling propulsion on the Northrop XB-35



issue no 2

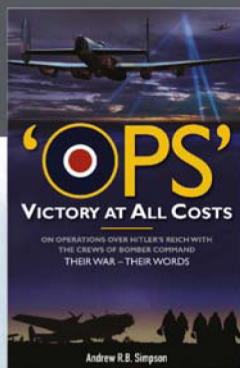


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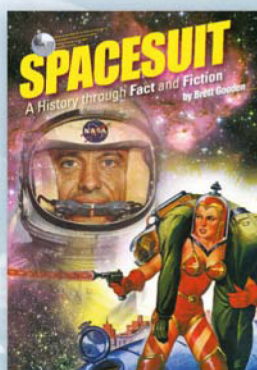
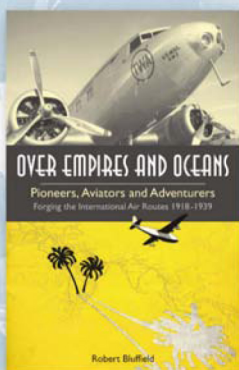
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The modern journal of classic aeroplanes and the history of flying

Editor's Letter

FIRST, PROFUSE THANKS to those of you who have taken the time to give such overwhelmingly positive feedback about the first issue of *The Aviation Historian*; and even deeper thanks to those who have joined the rapidly-growing community of TAH readers. We are truly grateful for your inspiration and encouragement, which has made us even more determined to continue bringing you the very best in aviation history.

Talking of which, we are delighted to introduce a new series, *Before & After*, featuring the artwork and research skills of Arvo Vercamer and Roger Tisdale, a team highly regarded for their work with World War One aviation society Cross & Cockade International. Not all their subjects will be from the Great War, however, and we look forward to further beautifully-illustrated coverage of captured aircraft in future issues.

One of the most valuable (and often entertaining) resources available to the historian is the first-hand account, and in this issue we have Hawker test pilot Duncan Simpson's vivid recollections of a somewhat trying, but ultimately fruitful, trip to South America to introduce the Hunter to Peru; plus the first half of Jonathan Pote's thorough history of Air America in Laos; a subject he knows well — he was there! Welcome to this second issue of TAH.

FRONT COVER *Knowing when to walk away? — the crew of the Northrop XB-35 on its maiden flight. From left to right: Orva Douglas, flight engineer; Fred Bretcher, copilot; Max Stanley, pilot.*

BACK COVER *A beautiful propaganda poster by Umberto di Lazzaro celebrating the long-distance tour of the Americas made by Italy's pioneering airman Francesco de Pinedo in 1927.*

The Cody Statue Project



TOP LEFT Sculptor Vivien Mallock with a full-size representation of the statue. MIDDLE LEFT The wreckage of Cody's aircraft in August 1913. LEFT "Cody's Tree", a famous Farnborough landmark. BACKGROUND An artist's impression of the finished statue adjacent to the FAST Museum.

FOLLOWING THE SUCCESSFUL creation in 2008 of a full-size replica of S.F. Cody's British Army Aeroplane No 1, the first aeroplane to make a powered, controlled, sustained flight in Great Britain in October 1908, the Farnborough Air Sciences Trust (FAST), in conjunction with Rushmoor Borough Council, Hampshire County Council and Rushmoor Rotary Club, is planning to commemorate in August 2013 the death of this pioneer aviator, who perished when his aeroplane broke up in the air, close to Ball Hill, near Farnborough. The centenary of this tragic event will be marked by the unveiling of a life-size bronze statue of Cody, in a prominent position by Farnborough Road, close to both the former South Gate entrance to the Royal Aircraft Establishment and the original position of the famous Cody's Tree, and beside the FAST Museum. The statue has already been commissioned from well-known sculptor Vivien Mallock.

FAST is now seeking donations towards the considerable cost of this statue and the works surrounding it. You can play your part in helping to commemorate this aeronautical pioneer and hero by sending a cheque to The FAST Cody Statue Project or by purchasing a commemorative brick, which will be laid in the paved area surrounding the statue. It is intended to engrave these with the names of individuals and the names of company sponsors. So, if you would like to associate your own name, or that of a relative or friend, permanently with Farnborough's unique aviation history, contact FAST at the telephone number in the panel below, or online.

Farnborough Air Sciences Trust, Trenchard House, 85 Farnborough Road, Farnborough, GU14 6TF. Tel 01252 375050 (office manned Sat/Tue/Thur). Websites: www.airsciences.org.uk, www.codystatue.org.uk, www.sfcody.org.uk



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AIR

correspondence

Letters to The Editor

Lightning versus U-2 — 1

SIR — I was particularly interested to read the piece in Issue 1 on the Lightning interception of the U-2. I have nothing really to add, as John [Mitchell] has given you an accurate and dynamic portrayal of the exercise! I have, however, one or two minor observations.

Rolling in behind the U-2, the overtake speed was dramatic and the radar return hurtled down the B-Scope at a very unfamiliar rate! My eyes widen when I think of it 50 years later!

I can see from my logbook that I flew to Middleton St George on November 11, 1962, then flew the profile on the 12th for the first time. Two more flights repeated the profiles on the 13th, followed by the actual interception on November 14. Sortie durations were 30, 35, 35 and 40min respectively. I did not fly again at Middleton until the 17th, when I returned to Wattisham.

I imagine that we gave the USAF food for thought! In my view our success in intercepting the U-2 was largely, if not entirely, dependent upon careful construction of the profiles by John and, on the day, outstanding close control by the radar controllers.

I wish you every success with your journal.

Peter Ginger *via e-mail*

Lightning versus U-2 — 2

SIR — Many, many congratulations on the launch of *The Aviation Historian*.

The Royal Air Force will be 100 years old in five years and three months. I joined in 1956, 56 years ago, so I am already one of those who saw service in the first half of the life of the RAF! I also flew solo for several hours in one of the RAF's two jet-engined aircraft which first flew in the Second World War (the Vampire) and flew as a passenger in the other one, the Meteor, of which we had one on AFDS [the Air Fighting Development Squadron] to tow banners for Lightning gunnery trials (successful trial, we showed that the gun installation was faulty).

Your article *Surprise, Surprise!* in Issue 1 was a real winner. One new aspect has just struck me

after reading it. I had completely forgotten that there was a first week of the trial in October 1962 then a second in November — I thought the two weeks were consecutive. However, on the radio a few days ago they discussed the Cuban Missile Crisis and the date of October 29, 1962, when things came to a head.

It seems obvious now that the AFDS detachment to RAF Middleton St George was recalled to RAF Binbrook to join other Lightning squadrons preparing to shoot down Russian bombers armed with nuclear bombs coming down out of the Arctic. I remember those days very well — we had to live on the base, sandbagged hangar windows and doors, erected showers at the entrance to wash off nuclear dust, I equipped all aircrew and groundcrew with personal dosimeters so that we could plan to keep flying for as long as possible until we were all dead. I remember being in the crewroom for the pilots' briefing: "Fire one Firestreak at the first Russian bomber, your second Firestreak at a second, fire your guns at a third and ram the fourth".

Mike Mason *Buckinghamshire, via e-mail*

Girls, girls, girls . . .

SIR — I've been enjoying the first issue of *TAH* a great deal, but wanted to submit one correction. In the TWA DC-3 crash story, Michael O'Leary states that Carole Lombard "was born Jean Peters in 1908". Her name, however, was Joan (Alice) Peters, not to be confused with Jean Peters, who married Howard Hughes. Both were Hollywood actresses and easy to mix up; who knows, perhaps Howard did!

Also, on page 68, the bottom photograph caption states that the picture was taken at Los Angeles International. I'm not sure where it is, but definitely not LAX.

Jon Proctor *Sandpoint, Idaho, USA*

. . . and inaccessible areas

SIR — I have read your issue 1 with great interest and it is very obvious that you tried, and succeeded, to bring a "different" approach to



Send readers' letters for publication to: Air Correspondence, *The Aviation Historian*, PO Box 962, Horsham RH12 9PP, UK, or (preferably) e-mail them to the Managing Editor at mickoakey@theaviationhistorian.com

aviation history publications. Very welcome, because the "traditional" magazines were becoming quite repetitive, predictable and, frankly, a bit boring. And especially: you managed to publish an issue that was not largely taken up by the *n*th rehash of Spitfire, Hurricane and Lancaster stories that add only minor and largely insignificant details. (Well, OK, you are to be excused for the Spitfire story you placed — it was at least "different").

However, there are some fairly serious drawbacks, the biggest one being that you print a relatively large number of photographs over two pages. DON'T! To have readers investigate details in the centre of folds is the business of porn-magazines, not aviation history journals. Moreover, because of the tight binding you employed, viewing the complete photographs in detail is virtually impossible. Don't let creative graphic artist-types dictate the layout of your magazine. Your audience wants to see a good complete photograph, if need be on its side, on one page.

Lightning F.1A XM177 of No 56 Sqn was one of four examples of the type used during Exercise Trumpet, the Air Fighting Development Squadron's high-altitude interception trials against Lockheed U-2s in late 1962.

That tight binding is something in itself that you need to reconsider.

As to the content, I am quite pleased, nice variation, it includes "exotic" material and also shorter 1–2-page interesting items. I wonder, though, if two long "gee-whiz" stories about famous entertainment personalities (Gable/Lombard and Heffner), with little aviation importance, are not a bit much.

If you fix some of these problems and manage to keep the non-British/USA content, i.e. the "exotic" content, up to par, I will be a satisfied reader.

Gerard Casius *The Netherlands, via e-mail*

It's a yes from me

SIR — Received my first issue of *The Aviation Historian* a couple of days ago and am mightily impressed. Congratulations on a magnificent new contribution to aviation publishing. I can hardly wait for the next issue.

Don Kilpatrick *Wiltshire, via e-mail*





AIR correspondence

Scientific and stimulating

SIR — I've now read the first issue cover to cover. Like all good issues of magazines, I get inspired to respond, by saying "Yes, I remember that" or "Don't forget the so-and-so".

I really like the fact that you've not shirked putting in technical stuff. The Rogallo feature was interesting and not something I knew. The Hawk/Harrier aerodynamic fixes amused me because I'm currently supporting work on a technical item on aerodynamic fixes — a directory of things people have done aerodynamically to aeroplanes to make them work properly — and your stuff is in there. Likewise Lightning/U-2, where you have the temerity to use terms like Mach Number, IAS, and by inference EAS, CAS, TAS, TGS and all the others, rather than the opt-out used by many others, "speed".

The 747 at Shannon reminded me of measuring up markings we'd placed on the runway edge at Torrejón in the course of a Skyvan trial. Dusk fell as we were working and our radio had packed up, but we just carried on. Air Traffic couldn't see us so the C-141 traffic was taking off and landing with the wingtips going over our heads.

Then the Boeing 307. I went to the Paris Air Salon in 1963, the trick being that you flew into Le Bourget the night before it started on the last Trident from Heathrow and kipped in the

terminal, all ready for the off at 0700hr the next morning. Looking out at 0700, the first aircraft I saw was a Boeing 307 F-BELU, the one and only time I ever saw one — and by 0710 it was gone.

I could go on.

Graham Skillen Somerset, via e-mail

Measuring up to *Air Enthusiast*?

SIR — Please allow me to share some comments about the first issue of *The Aviation Historian*.

First of all may I start by unequivocally stating that the benchmark I will be comparing *TAH* with is, to my mind, the superlative *Air Enthusiast Quarterly* (later just *Air Enthusiast*) by William Green and Gordon Swanborough.

A. *TAH* is a very pricey magazine. Granted it has 132 pages, but they are digest-size and therefore provide less value for money. It is also awkward to have to shift axis in mid-read the better to appreciate the colour profiles. It also means less of a read because more space per page has to be devoted to ensure that photographs are reproduced in a size that can do justice to detail.

B. In such a publication it is important I think that each subject matter be examined and explored in sufficient detail in order to provide meaningful insight. This means that articles which are three to five pages long do not deserve inclusion in the magazine. If I might at this point refer to the first issue of *Air Enthusiast Quarterly*, please see the excellent detailed article on the Polikarpov I-16 and its role in the Spanish Civil War and the magnificent study exploring all the whys, whereofs and ifs of Wackett's Wonder.

C. Again, to make best use of space and increase the content value of the journal I think that book reviews, photographs without an accompanying article etc should be left for the website, which today provides the ideal place for such items.

Ray Micallef Malta GC, via e-mail

Ding! Dong!

SIR — The first production model 0001 has landed safely on the doormat. I am very impressed! Well done; it's a very high quality production. To put it in the words of a mythical A&AEE pilot — "A new aircraft landed this morning, taxied in and most of us couldn't resist walking out and having a look. This kite looked good: if it looks right, it will fly right." Moustaches twitched in unified approval. We looked at the layout in the cockpit. Everything was to hand, well laid out and easy to navigate. "Shouldn't have any trouble with this one", was a typical

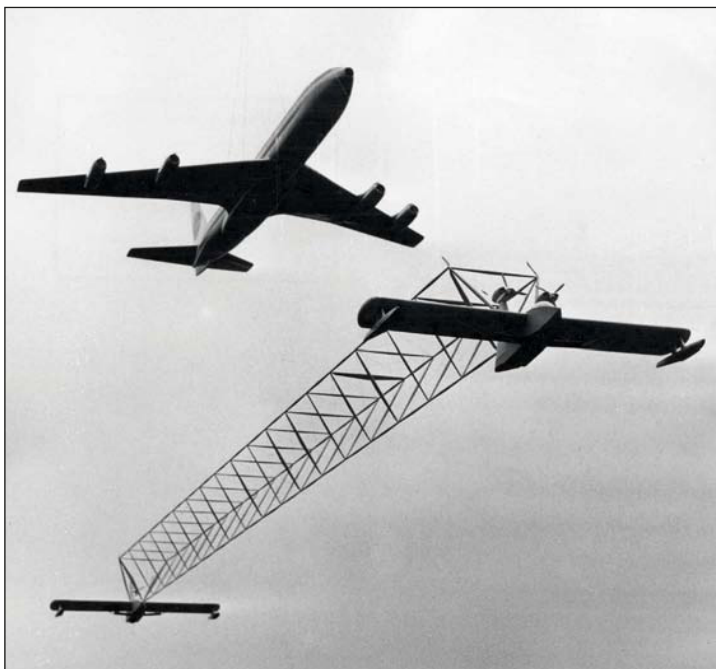
WW1 aviation pin-ups for 2013

IN AID OF the maintenance fund for the British Air Services Memorial at St-Omer in Northern France, **Cross & Cockade International** has once again produced a fine wall calendar. Created by Roger Tisdale — who, along with Arvo Vercamer, has provided the material for the *Before & After* article on pages 56–57 of this issue — it features 12 excellent

paintings by artists including Colin Ashford, Mark Postlethwaite and Roger Middlebrook.

Copies are available for £10.99 (+ p&p where applicable) from **C&C's** online shop on its website at www.crossandcockade.com, or by writing to **The Sales Manager, Cross & Cockade International, Woodlea, Tattershall Road, Woodhall Spa, Lincolnshire LN10 6TP, UK.**





ABOVE The photographs handed to Philip Jarrett by the designer of the Camco V-Liner, Lewis McCarty Jr, in the 1960s. Clockwise from top left: A head-on view of the model of the world's longest (and probably slowest) aircraft; the model with a Boeing 707 model to give an idea of the projected full-scale aircraft's length; three of the project's major players — left to right: Air Cdre A.H. Wheeler, technical adviser; Lewis McCarty Jr; William Slater of Slingsby.

remark. "Got it right from the start", was another, "We've waited a long time for a really classy kite", was another. An RN (FAA) officer by the name of Sub-Lt L. Phillips wandered into the Hefner lounge and exclaimed "Ding! Dong!" That part was really plush, "better than a Hastings interior", said a Transport Command veteran, grizzled by years of piston power. And so on . . .

To be serious, it is an excellent production. The different size and square-back binding lifts it out of the crowd. Nice to see that pictures have been restrained from morphing into others. That is a big beef of mine with current aviation magazine layouts. A really good Charles E. Brown image should never be morphed or Photoshopped. They stand alone, as that is what C.E.B. would want. I like the warm tones on the black-and-white photographs, and the cover choice is brilliant — such clarity. You can almost see his wrist-watch, and smell the Brylcreem.

If I could choose a favourite colour picture it has to be the Hefner DC-9 crossing the highway at night. What makes it for me? The US Highway

cop looking at the camera. You can imagine the spoken drawl and gum-chewing.

Well done, chaps; I look forward to the next one.

Roger Carvell Hitchin, Hertfordshire

Camco recollections

SIR — Seeing the Camco V-Liner in *TAH* No 1 brought back some distant memories. I was working as a library assistant at the Royal Aeronautical Society in the mid-1960s when Lewis McCarty Jr, a rather reserved American, paid us several visits to do some research into this extraordinary project. Naturally he did not say too much until the design was finalised, but when he kindly presented me with a press release and pictures in appreciation of my help and interest, I was stunned by what I saw. I remember a lot of pessimism among some of the other library visitors from British companies, and a few caustic comments, but the disastrous Slingsby fire meant that we would never know whether the project would have proved practical and profitable.

Philip Jarrett Dorking, Surrey



JOHNNY de UPHAUGH

1934–2012

AS READERS OF *TAH* may have noticed, we dedicated Issue No 1 to the memory of Johnny – who died at home in Dorset on September 13, 2012 – describing him as one of historic aviation’s “true believers”. I hope this obituary and appreciation will help to explain why.

It took me far too many years to come into proper contact with Johnny (I knew him for only the last ten years of his life) but in all my nearly three decades on *Aeroplane* he was to be one of the magazine’s most distinctive authors, as elegant in his writings as he was in his manner and attire. Then, when Nick Stroud and I moved on and began hatching the plot which resulted in *TAH*, Johnny was an immediate and enthusiastic supporter of our venture. We were looking forward to working with him for many more years; but sadly it was not to be, and he died just before this journal’s first issue came off the presses.

Early years

Born in Navan, County Meath, Ireland, on January 1, 1934, John Richard Duppa de Uphauigh (pronounced “Dupper”) spent his early life in rural surroundings near Dublin before his family moved to Shropshire. With a sister, Sara, being seven years his junior – a lifetime in children’s terms – Johnny was quite a lonely, solitary little fellow, but he learned to be comfortable in his own company.

Just after the outbreak of World War Two, the family moved again, to the edge of Romney Marsh in Kent. It was almost inevitable that, in those most

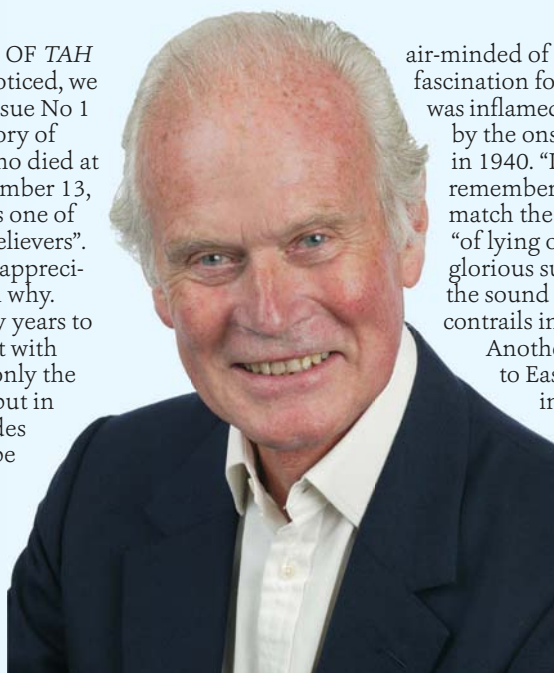
air-minded of days, Johnny would have a fascination for aircraft, but that passion was inflamed into a lifetime’s devotion by the onset of the Battle of Britain in 1940. “I watched it, aged six”, he remembered in a letter. “Nothing can match the memory”, he later wrote, “of lying on one’s back during those glorious summer days, listening to the sound of Merlins, watching the contrails in the sky”.

Another house-move, this time to East Anglia, brought Johnny into proximity with RAF and USAAF bombers and the latter’s fighter escorts. He would watch the huge formations gathering in preparation for their raids, and hours later see the survivors return – a sobering experience for an eight-year-old. There were lighter sides too, though: “We enjoyed frequent low-level beat-ups over Thetford

Forest by North American Mustangs, a droptank from one of which a neighbour kindly converted into a canoe for me to paddle on the nearby Ouse”.

Fun could be salvaged even from forced-landed aircraft, if they were lightly guarded: “chewing gum and barley sugars from the ration packs and, unbelievably, a Browning machine-gun that I strapped to my bicycle crossbar. That was kept secretly in the attic and caused my father great embarrassment with the Police when we moved house”.

School, on the other hand, did little for Johnny. Right from the earliest experience of pre-prep he suffered anxiety; and the stutter which he never entirely conquered became an essential part of the de Uphauigh delivery and charm right through to adulthood. It was a weakness inevitably preyed upon by master and peer alike.



ABOVE Johnny de Uphauigh – author, aviation literature connoisseur and supreme “true believer” – in late 2007.

AEROPLANE



ABOVE LEFT Wearing his child's-size RAF uniform from Hamleys, Johnny stands to attention for a photograph at home in Kent during Christmas 1939. **ABOVE RIGHT** Immaculately turned out and looking like a film star — Johnny beside Herald G-APWA in 1960. **BELOW** Johnny's letterhead was "borrowed" from his favourite artist, Eric Ravillious.

Matters reached a peak when Johnny was at prep school in Wokingham, far from the family on the Norfolk/Suffolk border. Distance, however, was no barrier in his mind, and on the walk back from chapel one morning he kept on walking. He stowed away on a train to London and onward to Thetford, from where he walked eight miles home in moonlight. His reception at home is unrecorded — but he was back at prep school two days later.

It was not a wasted mission, though: he returned to a hero's welcome from admiring classmates. School was to become palatable at last.

Not so Harrow, however. Johnny continued to be preyed upon by masters who singled him out for reading aloud in class, in the full knowledge that the stutter rendered him speechless.

Redemption was found in the sport of rifle-shooting and in the Air Cadet Corps where, at last, he pursued his love of aeroplanes as a participator rather than observer for the first time.

To de Havilland . . .

Johnny's next step was to put school behind him, and at the age of 17 he won a scholarship to the de Havilland Aeronautical Technical School (DHAeTS)

at Hatfield. He wasn't quite rid of Harrow, because at the DHAeTS he shared modest and dingy digs with fellow old Harrovian Charles Ranald. They rode to work on a pair of single-gear 98 c.c. Corgi folding motor-scooters — developed, appropriately enough for aeronautical people, from the wartime Welbike, designed to be dropped by parachute for the use of airborne troops. The boys' digs were rendered ever more dingy by the fact

that they doubled as a garage and maintenance workshop for the bikes. Despite the surroundings of grease and mechanical detritus, Johnny's immaculate carriage and attire earned him the nickname of Tailor & Cutter — perhaps an Harrovian attempt at rhyming slang.

At last Johnny was in a world of his choice, where he flourished. His

apprenticeship ran from 1951 until 1955, and offered a choice of three specialisms; he chose Production over Design or Maintenance. Naturally his existence was centred upon de Havilland's base at Hatfield, where a lot was going on. Piston-engined transports were still coming off the line, in the shape of Doves and Herons, but they were eclipsed by the jet fighters — Vampire, Venom and D.H.110 (later named Sea Vixen) — and the pioneering, elegant



but initially tragedy-prone Comet jet airliner.

National Service then intervened, with a spell in the Coldstream Guards – an obvious choice, given Johnny's ramrod bearing. When he received his commission Johnny took his duties seriously, for example guarding St James's Palace. As Ensign, his contribution was to ensure that his guardsmen were awake and alert through the long night. This was accomplished by waking up and donning full kit each night at 0300hr and demanding,

"Tell me, Guardsman, what would you do if you saw a German battleship steaming down St James's?"

There was only one correct answer: "I'd sink into me boots and fire at them through me laceholes, sir".

"Very good, guardsman. Carry on."

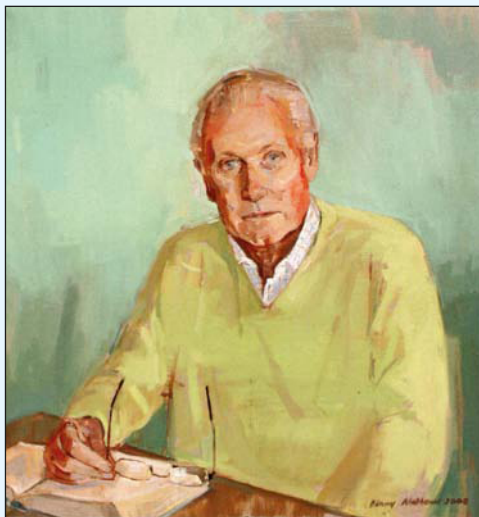
During this time, says Charles Ranald, "One of Johnny's secret fantasies was to see himself as an escapologist. If adequately primed with drink after a good dinner he would demonstrate how he could escape from a closed but not locked boot of a small family car. By some unknown means he would reappear grinning broadly on the back seat."

... and Handley Page

After two years' Army service, Johnny transferred into the world of advertising, sales and PR – but still within aviation, beginning with a memorable period with the Handley Page company in the late 1950s and early 1960s. He made several aircraft sales/publicity tours to Europe, West Africa and South America, promoting the Dart Herald feederliner. Duties included accompanying Aristotle Onassis on a shopping trip from Nice to London in a Herald; the Greek shipping magnate brought a couple of friends along, in the shape of Prince Rainier and Princess Grace of Monaco. All went swimmingly until an electrical fire broke out in the cockpit; but luckily the problem was masked by a quick-thinking stewardess's application of air-freshener and rapidly-recharged glasses of champagne to distract the VIP passengers.

A sales trip to Brazil included low-level beat-ups of Rio's Copacabana Beach and Iguaçu Falls – which, thanks to his subsidiary role as flight-test observer and fuel-flow monitor, Johnny was able to enjoy while standing between the pilots' seats.

By about 1965 Johnny was working for London advertising agency Horniblow Cox-Freeman (HCF), and became involved in sponsorship of the *Daily*



ABOVE A superb oil portrait of Johnny at his desk, painted by Dorset-based artist BINNY MATHEWS.

Mail Transatlantic Air Race of May 1969.

Johnny's clients included Scottish Widows and unit trust managers Castle Britannia (CB). The latter became a major client of HCF subsidiary Horniblow Cox-Freeman de Upaugh Ltd; Johnny helped CB's development into Malta and Cyprus. He retained a love of travel, volunteering to fly to meetings in places such as Cyprus and Anguilla. His sense of adventure and the absurd was later tested, though, when exporting his firm's expertise in privatisation to less luxurious desti-

nations such as Bulgaria, Romania and Ukraine.

In all this travel, one of Johnny's great passions was architecture; buildings (and ruins) were his visual links with a civilisation, and he was driven to discover who built them, how, why, and at what human cost. One such venture took place in 1972 when, after much bribing of police, he climbed to the top of the Great Pyramid at Giza. "You go up the crumbling bits at the edge, which is quite easy," he told me once, "but coming down is horrid."

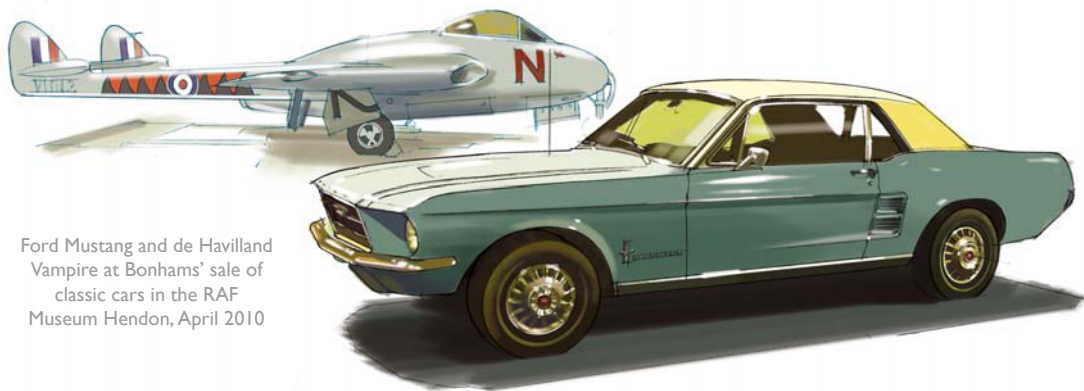
Horniblow Cox-Freeman and de Upaugh was eventually sold to City PR firm Dewe Rogerson, with which Johnny worked until he retired in 1998 as Director, European Operations. He was then able to move to Dorset to recapture the rural surroundings of his youth and devote time to travel and writing, especially aviation history. A favourite travel destination was Italy; where, as well as admiring more than two millennia's-worth of architecture, he made many good friends in his search for information from families of Italy's distinguished pioneering aviators and aeronautical engineers [see page 14 for a feature written by him – Ed].

Following a battle with cancer, borne with such determination and good humour that his death came as a great shock to aviation friends who had been talking to him mere weeks earlier, Johnny leaves a widow, Diana (née Collison; they married in 1973); three children, James (from his first marriage, in 1959, to Patricia, née Nicolls), Cornelia and Edmund; and three grandchildren. His departure reminds us of the value of a life lived to the full; and his story, with its powerful wartime influences and early displays of doggedness in adversity, recalls the Jesuit maxim "Give me a child until he is seven and I will show you the man".

MICK OAKEY, with special thanks to Nico Rogerson, who provided much of the material

Ian Bott Illustration

Professional illustrator specialising in aviation, motoring and other technical subjects and information graphics



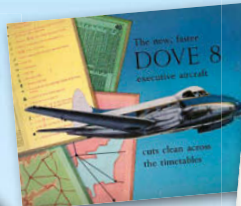
Ford Mustang and de Havilland Vampire at Bonhams' sale of classic cars in the RAF Museum Hendon, April 2010

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*A portrait of the Marchese
Francesco de Pinedo
in formal military dress
following his return to Italy
after his 25,000-mile flight
from Italy to the Americas
during February—June 1927.*

Francesco de Pinedo

LORD OF THE DISTANCES



In one of his final — and finest — features the late **JOHNNY de UPHAUGH** tells the story of the *Marchese* Francesco de Pinedo, one of Italy's most intrepid inter-war air pioneers, who made several epic long-distance flights in the 1920s and 1930s to prove the virtues of the flying-boat, and whose state of mind ultimately diminished in proportion with his fame

ON THE MORNING of Saturday, September 3, 1933, at Floyd Bennett Field, Brooklyn, a 43-year-old man wearing a serge suit, immaculate bow tie, grey bowler hat and blue bedroom slippers made a short speech to a waiting crowd and climbed aboard a single-engined Bellanca monoplane named *Santa Lucia* loaded with more than 1,000gal (4,500lit) of fuel. His aim was to fly solo and non-stop to Baghdad 6,300 miles (10,100km) away, significantly further than the then-current French distance record (not solo) of 5,567 miles (9,000km) established just the

previous month by a flight in a Blériot from that same airfield. A couple of minutes later, after a long take-off run and several bounces, the aircraft, which had failed to get airborne, slewed off the runway, ran through a perimeter fence which sheared off its undercarriage and exploded in flames. The pilot was thrown through the windscreen and died in the ensuing fireball.

As if his clothing was not eccentric enough, a look inside the Bellanca's cabin showed, according to *Time* magazine, a bizarre collection of "eight watches, two coloured kites, fishing tackle, a stomach pump to draw liquids from six



PHILIP JARRETT COLLECTION

ABOVE The single-engined SIAI S.16 was a bold choice for de Pinedo's 1925 voyage of some 35,000 miles, but the Marquis was determined to demonstrate that flying-boats were the aircraft of the future. Here Gennariello is seen at one of its stops on the journey, the (comparative lack of) dress of the helpers suggesting it is an Indian location.

BELOW The menu from a dinner held by Le Associazioni Aeronautiche Milanesi on December 7, 1925, to celebrate de Pinedo and Campanelli's extraordinary 35,000-mile flight, which had been completed the previous month.

vacuum bottles, a siren and water squirter to wake up the pilot if he dozed". Also, things had been arranged so that the pilot sat on top of the oil tank in the hope that the warmth would help to keep him awake — it would probably have done the opposite.

The pilot was the *Marchese* de Pinedo, a retired General in the Italian Air Force, a hero in his country and famed elsewhere for his pioneering long-distance flights. Friends had expressed concern at his mental state on that day, but his story is one of exceptional achievement that did not deserve such an horrific end.

THE EARLY YEARS

Francesco de Pinedo was born into an aristocratic family from Naples in 1890 and his title of Marquis was inherited. It was thought that he would become a lawyer, but he entered the Italian Navy instead, seeing action in the First World War. In 1917 he transferred to the newly-formed naval air service, where he was trained to fly by Giuseppe Rossi, who held Italian Pilot's Licence No 27, and then to the *Regia Aeronautica* (Royal Italian Air Force) when it was created in 1923 as a separate arm of the forces headed by General Italo Balbo, soon to become a world-famous aviator himself and intimately involved with de Pinedo's future exploits and eventual demise. At the Aeronautica, de Pinedo was

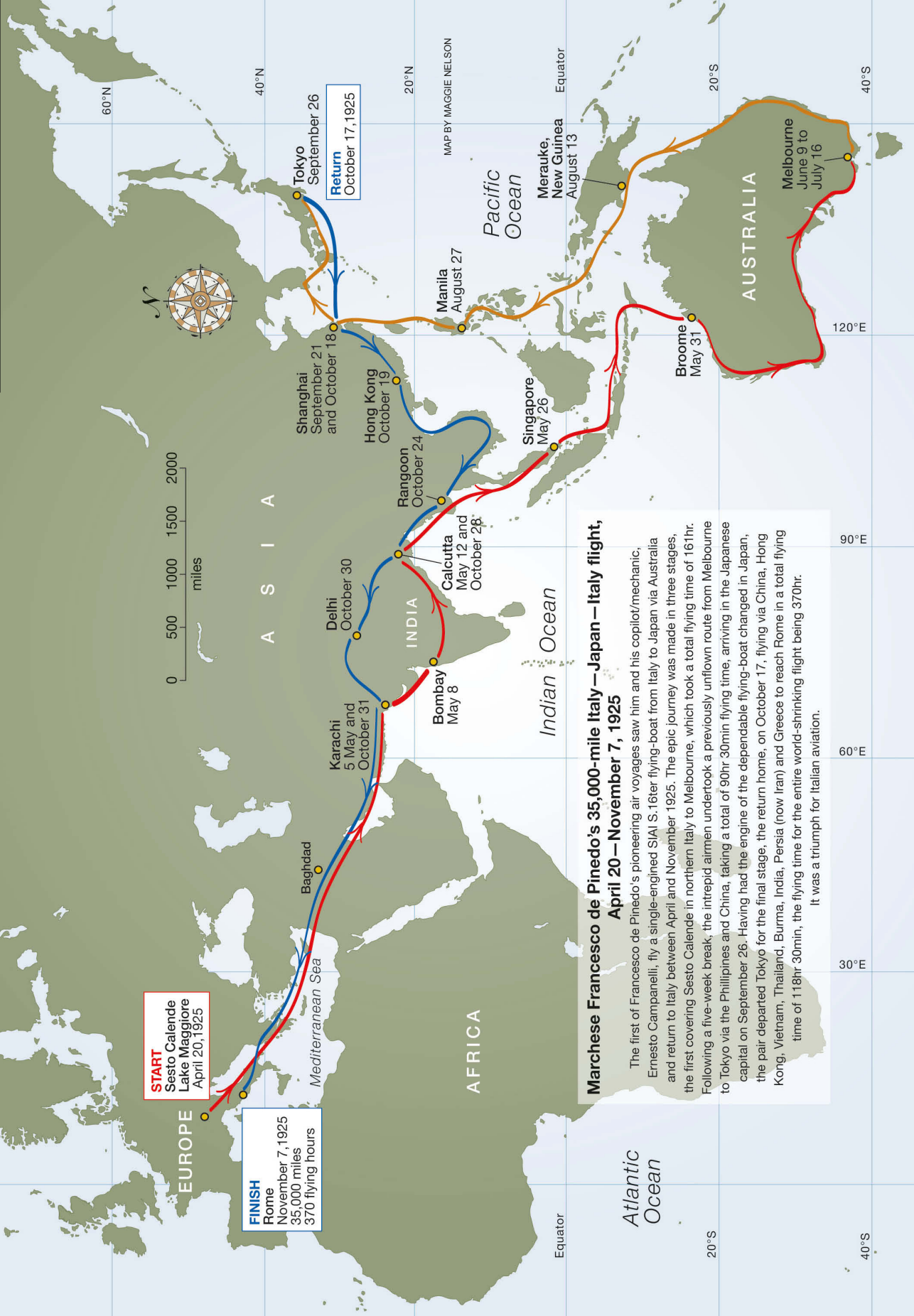
appointed chief staff officer with the rank of major, a post which seemed to suit this quietly-spoken and immaculately-dressed young man.

A desk job sat uneasily with his adventurous spirit, though, and within a year he was bored and applied for leave of absence to undertake a series of pioneering flights. His aim was to prove the practicality of the flying-boat as a means of long-distance travel, which tied in well with the Italian government's desire to publicise the abilities of its aircraft industry, which was in great need of export orders to fill its post-war over-capacity. With his naval background the choice of a flying-boat was not surprising, but it accorded with the then-current belief that the future lay with seaplanes. Runways were grass and airports expensive and few and far between, but sea covered a large proportion of the world's surface and did not every great city have a seaport? "Civilisation is built on water", as de Pinedo used to say.



THE FIRST ADVENTURE

His first adventure was ambitious. He proposed to fly from Italy to Australia via India and then to Japan, returning via China — a total distance of around 35,000 miles (56,000km). This was an extraordinarily ambitious project just five years after Alcock and Brown had first flown the Atlantic. It received official backing from the



Aeronautica. The route was carefully planned on French nautical charts, the only navigational information source available.

The aircraft de Pinedo chose was the SIAI (*Società Idrovolanti Alta Italiana*) S.16ter. It was a wooden-hulled biplane flying-boat, powered by a single 450 h.p. Lorraine-Dietrich V12 engine and had a wingspan of 50ft (15.24m), a range of more than 900 miles (1,450km) and an endurance of some nine hours. Although a substantial part of the route would be over land, de Pinedo decided, sensibly, that in the event of a forced landing it would be safer to put a smooth-hulled flying-boat down on desert sand or scrub than to attempt a landing on water with a wheeled undercarriage; hence his choice of the S.16. And, anyway, he was out to prove the superiority of flying-boats. The S.16 was a rugged and proven aeroplane — the prototype had flown six years earlier in 1919 and, as well as operating in the passenger role, military examples had seen service with the Italian, Brazilian, Spanish and Soviet Air Forces.

The Marquis christened his aeroplane *Gennariello* after the patron saint of his birthplace Naples, St Gennario, whose blood in a phial is supposed to liquefy in an annual ceremony if the city is to enjoy good luck in the coming year. Francesco flew with just his mechanic, Ernesto Campanelli, who was able to act as second pilot on long hauls. There were no spares depots or maintenance facilities along the route, which says much for his confidence in the reliability of the S.16, its Lorraine-Dietrich engine, the resourcefulness of Campanelli and possibly, as a good Catholic, in

the watchful presence of St Gennario. But de Pinedo did cautiously pack a sail so that he could make progress in case of an emergency alighting at sea. A photograph shows him practising using the S.16 as a yacht.



Gennariello left its manufacturer's seaplane base at Sesto Calende on Lake Maggiore on April 20, 1925, and arrived in Karachi on May 5. From there it flew down the coast of India to Bombay before striking across the sub-continent to Calcutta and then to Singapore before reaching the north coast of Australia at Broome on May 31. The Marquis then proceeded to fly anticlockwise around the coast to Melbourne, where he stayed for five weeks. This was the first aeroplane to reach Australia from Europe and eventually return. Leaving that continent, he flew north via New Guinea, Manila and Shanghai — a route "not previously covered by the wings of an aeroplane", exulted *Flight* — and arrived in Tokyo on September 26. The crew of

Gennariello spent three weeks in Tokyo and, not surprisingly, changed the engine of the S.16.

On October 17 he and Campanelli began the return journey via Hong Kong, Rangoon and Calcutta, reaching Rome on November 7 to a triumphal reception. They had covered the 35,000 miles in 370 flying hours and the Marquis was promoted Colonel.

NEXT — THE ATLANTIC

For his next great trip de Pinedo, again with official backing, chose the twin-hulled Savoia-Marchetti SM.55 flying-boat powered by two Isotta-Fraschini engines mounted in tandem on a

ABOVE In 1926 de Pinedo published his memoir of the previous year's flight, *Un Volo di 55,000 Chilometri*, which included a dedication to, and a foreword written by, Benito Mussolini.

BELOW *Gennariello* at Broome, Western Australia, on June 1, 1925, having arrived the previous day. PHILIP JARRETT COLLECTION





A superb photograph of Gennartello on the River Tigris at Baghdad, where de Pinedo and Campanelli arrived after flying from Alexandretta (now Iskenderun) on the Mediterranean coast of Turkey, on April 25, 1925, five days after leaving Sesto Calende. The pair spent a day in Baghdad before setting off for Bushire (now Bushehr, part of Iran) on the 27th. Baghdad was visited again on November 3 on the return part of the voyage and it is not known on which occasion this photograph was taken.



- ART. GRAF. - SANJUST - ROMA -

**I GIOVANI ITALIANI
ISPIRANDOSI ALLE EPICHE GESTA DI
NOBILE DI DE PINEDO E DI DE BERNARDI
DEBBO DIVENIRE MILITI DEL CIELO**

**IL DVCE È IL PRIMO SOCIO DELL'AER. CLYB D'ITALIA
ITALIANI SEGVITENE L'ESEMPIO PER
FORMARE UNA MILIZIA COMPAT-
TA DI CREDENTI NELL'IDEA AEREA
QUOTA ANNUA £15 - ROMA VIA DEL TRITONE N° 183**



ESENTE DA BOLLO Nota Ministero Finanze 9 Ueun 310 - 1927 N° 56677

The SM.55 was designed by Alessandro Marchetti, who joined SIAI to establish Savoia-Marchetti in 1922, and who incorporated a number of unusual features in the design of the flying-boat, including its distinctive double hull and its tandem engines which drove counter-rotating propellers.



OPPOSITE PAGE This typically stunning Italian propaganda poster of 1927, proclaiming the achievements of de Pinedo and other Italian aviators, states that "young Italian men inspired by de Pinedo and [seaplane racing pilot] de Bernardi should become soldiers of the sky".

"FOR HIS NEXT GREAT TRIP DE PINEDO CHOSE THE SM.55, WHICH HAD ALREADY ESTABLISHED 14 WORLD RECORDS FOR SPEED, ALTITUDE AND DISTANCE ..."

pylon above the wing. This type of aeroplane had already established 14 flying-boat world records for speed, altitude and distance. It would go on to be the favourite choice of Italo Balbo for his long-distance formation flights. The Marquis christened the 'boat *Santa Maria* in memory of Christopher Columbus, since this time he was heading west across the Atlantic to the Americas.

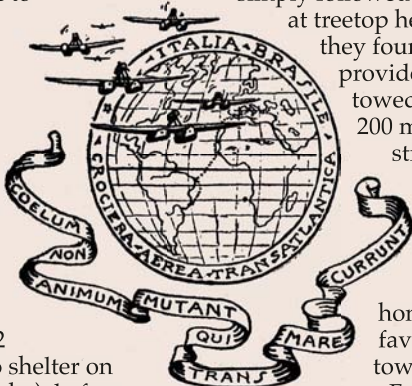
For this epic flight de Pinedo chose Capt Del Prete, an experienced long-distance flyer who had helped him plan his trip to Australia, as his copilot. Also carrying mechanic Vitale Zachetti, de Pinedo and Del Prete set off from Rome on February 8, 1927, heading for South America via Senegal and the west coast of Africa, arriving in Natal on February 22 (after being forced by a storm to shelter on the island of Fernando de Noronha), before flying down in stages to Rio de Janeiro and reaching Buenos Aires on March 2. Naturally, cheering crowds, banquets and speeches punctuated their progress, events that tried the patience of the shy, patrician Marquis who was renowned as a man of few words, but who always made a point of shaving and changing out of his flying kit before stepping ashore to greet those who

welcomed him despite exhausting hours in the air.

On March 13, after a change of engines, the *Santa Maria* headed north through the central part of south America, overflying for the first time Brazil's great rain forests, the Matto Grosso. This was the most hazardous section of the journey. There were no reliable maps; the crew simply followed winding and half-hidden rivers

at treetop height. Landing at one outpost, they found the river too sinuous to provide a take-off run and had to be towed for a couple of days and nearly 200 miles to find a sufficiently straight stretch. Eventually the crew reached Manaus, putting down on the broad Amazon. There, an exhausted de Pinedo not surprisingly slept through a gala performance given in his honour of *Madame Butterfly* by his favourite composer, Puccini, at the town's famous opera house.

From there the *Santa Maria* and its crew continued down the Amazon before turning north to Guyana, over the Caribbean to Havana and on to reach the USA at New Orleans on March 29 — the first foreign aeroplane ever to land on American soil. Its route then took it to the lake behind the Roosevelt Dam near Phoenix, Arizona, where, on April 6, disaster struck.





LEFT Italo Balbo (furthest left) and de Pinedo (second from right) in Spain in 1928. The previous year the latter had been appointed an honorary colonel in the Spanish Air Force and given the Spanish Air Medal in honour of his achievements.

RIGHT Spectators gather around Santa Maria II, the second of the SM.55s used on de Pinedo's tour of the Americas in 1927, after the loss of the original Santa Maria in Arizona on April 6.

BELOW The original Santa Maria under tow at an American port before its later destruction at Roosevelt Dam. The Marquis is standing on the stern of the boat. Note the fasces painted on the twin hulls.

UP IN SMOKE

A mechanic refuelling the aircraft lit a cigarette. The *Santa Maria* was totally destroyed in the ensuing blaze. Since the flight was attracting worldwide attention, and Italian prestige was at stake, Balbo immediately shipped a replacement SM.55 to New York. The Marquis and his crew were flown there by the US Army and the new machine arrived in early May. After assembly, it was naturally christened *Santa Maria II* — with mineral water, this being America's prohibition era — and carried the Latin inscription *Post Fata Resurgo* ("I arise after death"). Thus their journey resumed on May 11. But de Pinedo's tribulations were not over. After flying up to Newfoundland

he set off for the Azores, but hit strong headwinds, running out of fuel some 200 miles short of the islands. They put down and were taken in tow by a small boat that had been on its way to Canada's Grand Banks to fish for cod. It handed the tow to a passing Italian steamer, the *Supergo*, which took the *Santa Maria II* in to harbour at Horta for repairs to damaged wingtips — they had been afloat for three days in rough seas.

On June 10 they were on their way again, but de Pinedo conscientiously first flew west to the spot where he had ditched before turning east to Lisbon and then Barcelona, arriving at Ostia, Rome's seaport, on June 16. Again, a tumultuous welcome awaited them. This time de Pinedo was





THE FASCES

The most ubiquitous icon of Italian fascism was the *fascies*, from which the term was derived. The traditional Roman symbol of a bundle of birch rods bound together with an axe represented strength through unity; a single rod is easily broken while the bundle is difficult to break. The axe symbolised the death penalty, i.e. the rule of law.



promoted General and made Chief of the Air Staff. Benito Mussolini christened him "Lord of the Distances". Popular songs were composed about him mostly, unsurprisingly, in the Neapolitan dialect. On August 15 the *Federation Aéronautique Internationale* (FAI) awarded him its first ever Gold Medal. Also, and unusually for a foreigner, he was awarded the Air Force Cross (AFC) by King George V for his achievements.

In the international media, however, this latest and extensive journey was eclipsed by Charles Lindbergh's solo Atlantic crossing from New York to Paris to win the Orteig Prize on May 20–21. Lindy had departed from New York three days before de Pinedo had left for the Azores.

True, Lindbergh had flown solo from America to the Continent for the first time, but de Pinedo had covered some 25,000 miles (40,000km) over hostile sea and land in just over four months from Italy via south and north America and crossed the Atlantic twice. Also Lindbergh is on written record, in reply to an Italian journalist, as saying that de Pinedo's was a "wonderful flight". The achievements were totally different, although King George also awarded Lindbergh an AFC. Each flight was heroic and it is arguable which was the greatest. How can you compare the perils of the cold Atlantic waters with the green hell of impenetrable Brazilian jungle? But the fact remains that Lindbergh's flight caught the world's imagination. For de Pinedo, and Italy, the timing was unfortunate and some might even say rather unfair.

BALBO'S AIR CRUISES

The following year, 1928, de Pinedo, then at the height of his fame as a long-distance pioneer, was appointed to lead the first and largest of Italo Balbo's famous four massed training and propaganda flights, or "air cruises" as he called them. This involved a total of 62 aeroplanes — 51 SIAI S.59bis single-engined flying-boats, ten SM.55s and one Cant 22 — and 200 people. Together they flew without incident 1,750 miles around the shores of the western Mediterranean via Sardinia, Majorca, southern Spain and France from their base at Ortobello on the west coast of Italy.

Two years later, in 1930, Balbo ordered a second air cruise, this time involving 35 SM.55 flying-boats and travelling some 3,300 miles around the eastern Mediterranean and on to the Black Sea. While Balbo himself again flew on the trip, he again appointed de Pinedo, whose reputation he then still deeply respected, to plan and lead the flight. The formations visited



Athens, Istanbul, Varna in Bulgaria, Constanta in Rumania and Odessa on Russia's south coast. While the tour was a success in every way, tensions surfaced between Balbo and de Pinedo over planning and apparently basic and simple things like landing sites, uniforms and seating-plans at receptions. Maybe it was simply a clash of personalities and Italian temperament; one was an aristocrat who had commanded the royal yacht earlier in his career, the other a provincial fascist who had been beside Mussolini for his March on Rome. Probably both men were *prima donnas*. Possibly this was the first sign of the apparent mental instability that worried de Pinedo's friends before his fatal flight.

A LAST GRAB FOR GLORY

Despite Mussolini's praise and the public acclaim in 1927, de Pinedo's popularity at government level was now waning. He had gone from being Balbo's friend to being his rival — Balbo is recorded as later saying that de Pinedo "was one of the four nails in my cross during the years I spent at the Aeronautica". Some said it was because de Pinedo had the temerity to court King Victor Emmanuel's daughter Princess Giovanna, later to become Queen of Bulgaria; either way he was effectively banished from the land which had hero-worshipped him and his exploits and sent to become Air Attaché in the Italian Embassy at Buenos Aires in Argentina, the city where he had received a hero's welcome halfway through his second epic adventure three years earlier. In Argentina he played polo, was probably bored again and had a car crash in May 1931, after which, according to the *Giornale d'Italia*, he "deteriorated physically and psychologically".

Despite having been "put out to grass" in a non-flying diplomatic role, de Pinedo seemed determined to make one last great individual



ABOVE "I hope that every kilometre of our voyage represents a young Italian man in whom we have awoken the desire to become an aviator" runs a quote from de Pinedo in this 1931 poster for the competition for admission to Italy's Royal Aeronautical Academy.

BELOW Bearing the name Santa Lucia, de Pinedo's choice of aircraft for his wildly ambitious planned flight from the USA to Baghdad was a specially modified Bellanca J-3-500, which bore the number 13199 and was fitted with extra tankage for long-distance flying.



journey for the record books in which he already had a distinguished place. So he resigned from the air force and, as a private individual, went to America to buy the Bellanca and plan his return to fame. Giuseppe Mario Bellanca was also Italian, an immigrant born in Sicily. Significantly, Lindbergh said he had also seriously considered a Bellanca for his Atlantic attempt before settling on his Ryan.

There was plenty of competition — 1933 was a vintage year for aerial achievements that captured the public imagination and bolstered national pride, not least from his country's viewpoint. The massed north Atlantic crossing by the aerial armada led by his nemesis, Gen Balbo, with his 24 SM.55 flying-boats had arrived in New York from Chicago to a triumphant reception only a few weeks earlier than de Pinedo's eventual departure from Floyd Bennett Field. (This was the fourth of the "air cruises" of which de Pinedo had led the first two. So one can imagine how this must have added to the



pressure as he prepared his Bellanca.) And Italy then held the world speed record with a tandem-engined Macchi seaplane at 423 m.p.h. and would gain the altitude record at 44,819ft the following April in a Caproni Ca 113. Sadly, de Pinedo was not to realise his dream of adding to the list of Italian achievements and returning to the record books when he climbed into the *Santa Lucia* in his eccentric flying kit and

carrying a patriotic message to be dropped as he flew over Rome on his way to Baghdad.

At Floyd Bennett Field that fateful September morning de Pinedo's mechanic is reported to have commented, "He simply forgot what he knew". Later, his friend, Ugo d'Annunzio, son of the famous poet and First World War fighter pilot Gabriele d'Annunzio, said, "His pride killed him". It was a sad epitaph for a brave and experienced aviator; but, as *Flight* magazine wrote at the time, "It will be his triumphs rather than his tragic end which will be remembered by history".



3 X PHOTOGRAPHS PHILIP JARRETT COLLECTION



TOP A grim-faced Francesco de Pinedo beside the *Santa Lucia* at Floyd Bennett Field minutes before his death. **ABOVE** The tragic end — de Pinedo's vastly overladen machine in flames after running off the runway and exploding. A film crew was present and footage of the failed take-off attempt may be found on the TAH website.

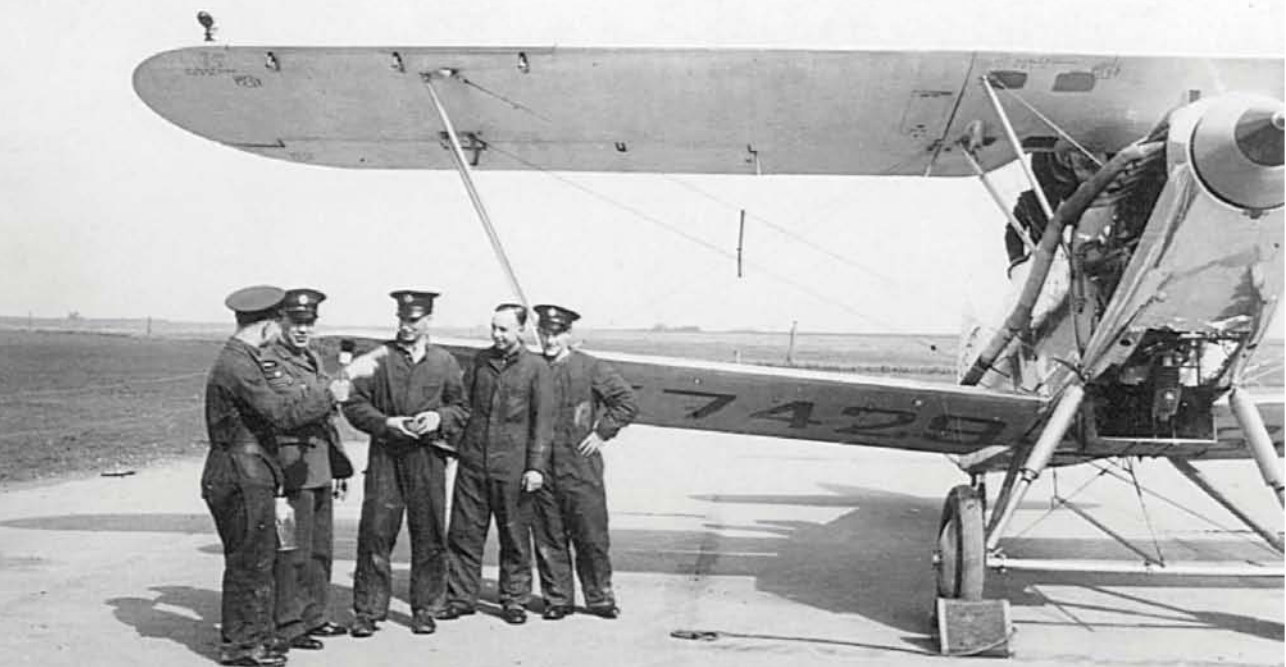
THE LION

and its CLAWS



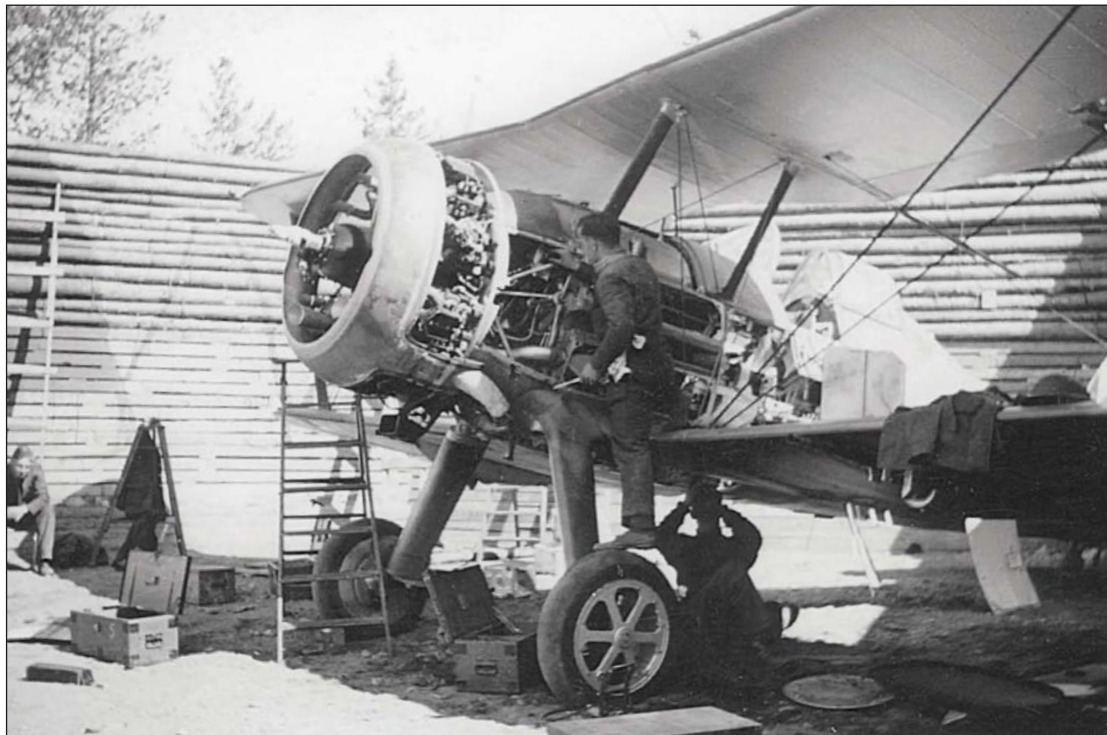
*In early 1940 Leading Aircraftman Hugh G. Rogers joined 263 Sqn at Filton as a flight mechanic to work on the unit's Gladiators, soon to be sent on an ill-fated posting to Norway. Rogers survived the unit's Arctic misadventure and remained with the squadron until the end of the war, working on its Whirlwinds and Typhoons. Rogers's son-in-law, **JIM WOOD**, shares Hugh's collection of photographs of the unit — motto "You shall know the lion by its claws . . ."*

Leading Aircraftman Rogers (furthest right) and his groundcrew colleagues stand beside Hawker Audax I K7429, probably some time before he joined No 263 Sqn, which re-formed at Filton on October 2, 1939, as a fighter squadron equipped with Gloster Gladiators.





ABOVE A *Gladiator II* in suitably Nordic surroundings, suggesting it may be N5628, one of 263 Sqn's aircraft, during its deployment to Norway in 1940 (where it was destroyed in a bombing raid, its remains now being on display in the RAF Museum at Hendon); it may, however, be N5626, which served with No 141 Sqn at Turnhouse in Scotland.



ABOVE A member of 263 Sqn's groundcrew works on a *Gladiator* in one of the distinctive log revetments at the unit's base at Bardufoss, near Narvik, during its second posting to Norway during May and June 1940. The logs were from trees that had been chopped down to lengthen the runway, which had been 50yd too short for *Gladiators*.



CLOCKWISE FROM TOP LEFT A groundcrew member works on a Gladiator at Bardufoss — note the winged-dog motif on the panel beneath the canopy; Flight Sergeant Harvey beside the tail of a 263 Sqn Whirlwind; a posed photograph of 263 Sqn pilots, probably taken by a professional photographer sent to take official portraits of squadron members.



ABOVE Flight Lieutenant David G. "Bill" Ross, an RAF Volunteer Reserve pilot who flew Whirlwinds with 263 Sqn. He was killed on May 2, 1942, while serving with another unit, reportedly having taken off in a Spitfire from Great Sampford after polishing off ten bottles of Benskins Colne beer with his CO, Sqn Ldr Gilbert, who was also killed.



ABOVE Whirlwinds fitted with bombs were unofficially dubbed “Whirlibombers”, an example of which, P6971, is seen here in October 1943 at the unit’s base at Warmwell in Dorset, from where the pugnacious twin-engined fighter-bombers would attack enemy shipping and airfields. That December the unit re-equipped with Typhoons.

BELOW Typhoons undergo maintenance in a former Luftwaffe hangar after 263 Sqn’s move to the Continent in August 1944. The “Tiffies” of 263 Sqn shared hangars with those of other squadrons, including 197 Sqn, a Typhoon of which, coded OV-A, is seen in the background. In the foreground is an Avro Anson also undergoing maintenance.



Air America Helio Courier XW-PEA (c/n 541) departs the typically primitive airstrip at Thakhek West in September 1966. In keeping with Air America's deliberately confusing and obscure registration system, this identity was also applied to at least two other Couriers at the same time, while all three were based at the airport in the Lao capital, Vientiane.

ALL PHOTOGRAPHS BY THE AUTHOR UNLESS OTHERWISE STATED



In 1965 British student **JONATHAN POTE** volunteered to spend his “gap year” with a medical team in Laos as part of the Colombo Plan — an experience which provided an unrivalled opportunity to see the work of the CIA’s “secret airline”, Air America, in South-east Asia at close quarters. In the first half of an in-depth two-part history he details the origins of Air America and how its pilots and groundcrew in Laos lived up to its motto of . . .

ANYTHING, ANYWHERE, ANYTIME PROFESSIONALLY

EVEN BEFORE THE Pearl Harbor débâcle which brought the USA into World War Two in December 1941, President Franklin D. Roosevelt had serious concerns about the USA’s intelligence-gathering activities, and had appointed William J. “Wild Bill” Donovan, a lawyer, to advise him. Donovan was no stranger to war; as a Lieutenant Colonel commanding the 165th Infantry Regiment in late 1918, he had led from the front and been awarded the Medal of Honor.

Back in uniform, he formed the Office of Strategic Studies (OSS) in June 1942. As well as the collection and analysis of intelligence abroad, the OSS was permitted to “conduct special operations not assigned to other Agencies”. It did indeed conduct military activities during World War Two (not only in French Indochina) and was involved in disagreements with both the military intelligence services and the Federal Bureau of Investigation (FBI) as a result.

In October 1945, very soon after VJ-Day, the OSS was disbanded owing to pressure from these organisations, and its functions were transferred to other State Departments.

It had, however, performed useful functions, and the by-now Major General Donovan successfully lobbied for “an organisation which will procure intelligence by overt and covert methods and will at the same time provide intelligence guid-

ance, determine national intelligence objectives and correlate the intelligence material collected by all government agencies”.

The National Security Council

It was also to conduct “subversive operations abroad”. As a result, the National Security Act of 1947 led to the formation of the National Security Council, and ultimately to the Central Intelligence Agency (CIA) under its direction.

The accountability of the CIA became cloaked in 1949, when it was decreed that funds could be

acquired from other government organisations secretly, and that there was no requirement for the CIA to disclose the names or salaries of its personnel (nor even indicate their numbers).

In time, the CIA developed profit-making subsidiaries (including Air America) to provide additional funds, but by 1949 the die was cast for an organisation that could fulfill all the covert military activities that the American government required, but for which it could not use the conventional Military Services. So nebulous did “The Agency” become that when Richard Helms became its head in 1966 and asked the seemingly simple question of how many aircraft and of what types were available to the CIA, it took three months of urgent investigation to provide an approximate answer, with the rider that the number fluctuated from day to day.

“The Central Intelligence Agency is an indepen-



dent United States Government Agency responsible for providing national security intelligence to senior US policymakers", so the organisation's Mission Statement blandly states. One could be forgiven for thinking that this mission did not require fighting wars on behalf of the USA, but "plausibly deniable" military activities were its routine fare. This is exactly what happened in Laos from 1954 to 1974, the largest such paramilitary operation the CIA ever attempted.

Air America was a major component in the "Secret War", which was kept from the American public for most of that time. The airline was only one of several used by the Agency (others included Inter Mountain, Southern Air Transport and Bird & Sons, which became Continental Air Services Incorporated on September 1, 1965), but was uniquely wholly owned by the CIA after 1950 via several holding companies.

The early days

The story of Air America starts with General Claire Lee Chennault. Retiring as a Captain from the United States Army Air Corps in 1937, Chennault went to China to advise the country's nascent air force. Soon after, Japanese incursions into China developed into a full-scale invasion. From his former compatriots, he recruited the American Volunteer Group (AVG — better known as the "Flying Tigers") to assist the fledgling Chinese pilots. The AVG (its Curtiss P-40 Kittyhawks adorned with distinctive "shark's mouth" markings) was inducted into the United States Army Air Forces, after Pearl Harbor, as the 23rd Fighter Group.

Post-war, the now retired Gen Chennault formed CAT (Civil Air Transport) as a cargo operator sup-



ABOVE *The unmistakably craggy-faced General Claire Lee Chennault beside a shark-mouthed Curtiss P-40 of the American Volunteer Group.*

plying the Nationalist areas of China. At first CAT ranged across the vast Chinese mainland, but with General Chiang Kai-shek finally banished to Formosa (now Taiwan) by Mao Tse-tung, it became seriously underused. The nascent CIA — already a customer — seized the chance to buy CAT outright, keeping it ostensibly still a civil airline but with the CIA now as the number one customer and with first priority.

The Korean conflict of 1950–53 provided much work, as did the closing days of French rule in Indochina. Fairchild C-119 Flying Boxcars (hurriedly transferred from USAF stocks and painted in French colours) were flown by CAT crews to help re-supply the doomed garrison at Dien Bien

Phu in Tonkin. Several were battle-damaged, and one flown by American World War Two ace James B. McGovern (otherwise known as "Earthquake McGoon") was shot down.

Morale among CAT personnel deteriorated and the administration remained too chaotic for the CIA's liking, so at the end of March 1959 CAT was reorganised and renamed Air America by its own board; a seemingly oddly obvious name for such a clandestine organisation. It was perhaps hoped that it would send out the message that America was there to stay, and to help, but it was regretted in later years when the situation had changed. The airline soon developed its own unconventional *modus operandi* and camaraderie which lasted until it followed CAT into oblivion in 1975.

The build-up

As early as September 1955, a year after the French débâcle at Dien Bien Phu, three Curtiss C-46s of CAT had begun to drop rice in mountainous

Air America Douglas C-47B "147" prepares for one of the thrice-weekly "milk run" flights at Thakhek East in mid-1966. This aircraft went on to become one of the last to leave Saigon in April 1975 as the city fell to the North Vietnamese.





ABOVE Sikorsky UH-34D Choctaw H-12 of Air America on the football field at Luang Prabang in north central Laos, until the communist takeover in 1975 the royal capital and seat of government of the Kingdom of Laos. Initially Sikorsky H-19 Chickasaws were used by Air America in Laos but, after the (non-fatal) loss of an H-19 at Na Nhom in May 1960, the type was withdrawn and replaced by the UH-34, which itself struggled in the hot and humid climate.

north-eastern Laos to avert famine. The USA foresaw a great need to alleviate hunger in order to contain the further spread of communism; and, for added measure, leaflets were also dropped in communist areas of influence.

The arrival of Douglas C-47A B-817 in the Lao capital of Vientiane on June 30, 1957, was the start of 20 remarkable years of "airline" activity. The American embassy felt the need to have its own aircraft to distribute supplies as the future Minister of Economic Planning in the new coalition was to be Prince Souphanouvong, a communist, whom it was thought might misappropriate American aid. From that point there was a steady build-up of aircraft and hours flown, and by 1966 Air America's fleet of more than 100 aircraft was flying tens of thousands of hours a year. The tasks ranged from pure civil aid to genuine military action by company personnel, and included the supply of most of the military equipment and ammunition needed by the Royal Lao Government forces.

There was no distinction between civil and military work; aircraft and crews switched from one to the other as needed. Some aircraft were bought on the open market, others "bailed" from the USAF or US Army for a nominal dollar. The crews were almost all ex-military, usually with recent experience in South Vietnam, so it was as simple to find someone who could use a North American T-28 to deadly effect over enemy territory as to find a pilot for a C-47 on a "milk run" (a conventional internal airline schedule), although more covert missions were restricted to a small cadre of pilots.

Air America competed for business against Bird & Sons, which was bought out by Continental Airlines to form Continental Air Services Inc (CASI) in 1965. Apart from hoped-for savings from com-

petition, nobody was fooled that CASI was anything other than the CIA's "other airline". Company pay was good (\$50,000-plus annually to fly a light aircraft in the mid-1960s), but it needed to be: During 1960–61 there were some 26 crashes, seven from enemy action. More than 200 Air America aircrew would be lost before 1975.

Civil war in Laos

The Geneva Accords of 1954 had ceded the north-eastern provinces of Sam Neua and Phong Saly to the pro-communist Pathet Lao pending re-unification of the Country after the proposed elections of 1956. In 1959 civil war flared again and elections in Laos produced a massive right-wing win. The following year Captain (soon to be General) Kong Le of the Royal Lao Army failed in a coup intended to bring politics to the middle road, and proceeded to annex some 10,000 troops as part of a neutralist army, causing an upsurge in political and military activity on all sides.

The same year, Air America acquired its first helicopters, four Sikorsky H-19s, which were found unsuitable and replaced within months by four Sikorsky UH-34s. The construction of "Victor" sites (renamed "Lima" sites from May 16, 1964, to avoid confusion with those in South Vietnam), to accommodate the small fixed-wing STOL types then entering the Air America inventory, also began in earnest. Created in mountainous terrain with only hand tools, these were perforce rudimentary. Built in a week or less, with a slope of up to 45° and a bend of 20° allowable, a runway of 100–200yd (92–184m) was considered adequate for a Helio Courier or, later, a Pilatus PC-6 Turbo Porter, the Courier being withdrawn around 1968.

The Courier had a troubled start in service,



ABOVE Showing the often atrocious condition of the landing strips, or “Lima sites”, Air America’s fleet of STOL aircraft were required to operate from, this photograph of Helio Courier XW-PEA was taken at Thakhek West on July 22, 1966. Air America’s Couriers in Laos were finished in bare metal with the registration in black midway up the fin and sported a black triangle under the port wing, the apex of which pointed towards the trailing edge.

BELOW As commander of the USAF’s 1095th Operational Evaluation Training Group during 1960–62, Major Harry “Heine” Aderholt was instrumental in developing the Lima sites in Laos for Air America’s STOL aircraft operations.

initially proving unreliable and unpopular with its single engine. On a proving flight to a new strip at Phong Saly in April 1960, Courier B-833 was detained by Pathet Lao troops overnight, but allowed to leave next day. Such gentlemanly conduct did not last long. The pilot, Major Harry C. “Heine” Aderholt, would rise to General rank as the war progressed, as would one of his passengers that year, Major Pao, later General Vang Pao, leader of the Hmong mountain tribal people.

The North Vietnamese also became involved in Laos as the 919th Air Transport Regiment of the Vietnamese People’s Air Force (formed at Gia Lam near Hanoi on May 1, 1959, later moving to Dong Hoi) began airdrops (using Antonov An-2 *Colts*, Lisunov Li-2 *Cabs* and Ilyushin Il-14 *Crates*) to road-construction teams in eastern Laos working on the nascent *Truong Son*, or Ho Chi Minh trail.

It soon added Mil Mi-4 *Hound* helicopters to its fleet to supply communist forces on the Plaine des Jarres. In December 1960 Soviet pilots, also using Il-14s, openly flew some of Kong Le’s forces from Vang Vieng (barely 50 miles, 80km, north of Vientiane) to the Plaine des Jarres as he regrouped and sided for a time with Communist forces.



Thailand, Tibet and Burma

The upsurge in activity was not only in Laos; at Takhli, 145 miles (240km) north-west of Bangkok in Thailand, CIA — and to a lesser extent USAF — clandestine operations built up. Lockheed C-130 Hercules flying over Tibet and Burma supported anti-communist elements there while Lockheed SR-71s and U-2s provided strategic reconnaissance over Asia. In the case of the Hercules, a USAF crew would arrive in Thailand for ten days of special ops, their aircraft assuming a new identity overnight. Its mission complete a week or so later, the faithful C-130 seemingly magically changed back to its previous (legitimate) identity while the crews slept off their fatigue.

In 1965 the author heard (still unsubstantiated) claims that Air America sent Fairchild C-123 Providers on similar temporary duties, to be used as bombers in northern Burma; reportedly, 500lb bombs were rolled out of the rear doors by hand. Certainly, Air America based its first unequivocally offensive aircraft at Takhli at this time: the Douglas B-26 Invaders acquired for Operation *Mill Pond*, the object of which was to bomb the Plaine des Jarres, although ultimately this operation came to nothing.



CHINA

0 50 100 150 200
miles

CHINA

BURMA

NORTH VIETNAM

Hanoi

Gulf of
Tonkin

20°N

MAP BY MAGGIE NELSON

HAINAN

18°N

INDO-CHINA

South
China
Sea

16°N

The Land of a Million Elephants

Modern Laos, a landlocked country of some 91,500 square miles bordered by Burma and China to the north-west, Vietnam to the east, Cambodia to the south and Thailand to the west, traces its heritage back to the 14th Century kingdom of Lan Xang, the "land of a million elephants".

In 1893 France made a unified Laos part of French Indochina, the country becoming independent in 1953. Its proximity to Vietnam made it an important part of the USA's anti-communist containment policy of the 1950s and 1960s. Central and southern parts of Laos later became vital sections of communist North Vietnam's supply lines — the Ho Chi Minh Trail — hence Air America's "plausibly deniable" presence in Laos.

THAILAND

Ubon
Ratchathani

Pakse

SOUTH
VIETNAM

14°N

Saigon
(Ho Chi Minh City)

12°N

CAMBODIA

Phnom
Penh

10°N

Gulf of Siam

Mouths of
the Mekong



ASIA

JAPAN

INDIA

Indian
Ocean

AUSTRALIA

Area
enlarged

Pacific
Ocean

100°E

104°E

106°E

108°E



LEFT Passengers aboard C-47B "994" during a milk run flight from Vientiane to Thakhek in February 1966. The author recalls: "The seats were extremely uncomfortable, especially on the ground with the tail down". Note the cargo packages roped together in the centre.

BELOW Curtiss C-46D N1383N (c/n 33641, built in 1945 as 44-78245) was acquired by Air America in 1963 and is seen here at Wattay, Vientiane, in 1966. This aircraft had been damaged in January 1965 when a nearby T-28 exploded, and in March 1970 one of its "kickers" fell out of the cargo door in flight — and survived.

On March 9, 1961, Pathet Lao forces took the village of Sala Phou Khoun, strategically placed where Route 7, from North Vietnam via the Plaine des Jarres, meets Route 13, the major road in Laos, running north-south near the Mekong, in this case halfway from Vientiane to the royal capital of Luang Prabang. American patience ran out. With the country cut in half and both those cities threatened (and the "domino theory" of communist strategy accepted as gospel) President John F. Kennedy reacted. He immediately sanctioned the transfer of 16 Sikorsky UH-34s from US Marine Corps stocks in South Vietnam to Air America in Laos, and ten days later mobilised all United States Forces in the Pacific. The transition to an all-out east-west war had started.

The standoff continued, but in May peace talks started between the various powers in Geneva. As these continued, Air America reconnoitred the country, and especially the Plaine des Jarres and

the Ho Chi Minh trail complex, with RB-26C Invaders as part of Operation *Black Watch*. The company's UH-34s and Curtiss C-46 Commandos were involved with clandestine airdrops over North Vietnam as well as delivering more legitimate rice supplies to the mountain peoples, principally the Hmong, of north-east Laos. The legendary Edgar "Pop" Buell, an Indiana farmer working for the US Operations Mission (USOM), covered the mountains largely on foot before organising drops of rice by the C-46s of Bird & Sons.

The Geneva Accords fail

On July 23, 1962, after more than a year of negotiations in Geneva (during which the American military stance had been relaxed), an "agreement" was reached and named *The Declaration & Protocol on the Neutrality of Laos*, which stated that all military forces would leave. President Kennedy's hope was that Laos could remain genuinely neu-

"Curtiss C-46 Commandos were involved with clandestine airdrops over North Vietnam as well as delivering legitimate rice supplies to the mountain tribes of north-east Laos . . ."





Air America Fairchild C-123B Provider N5005X has its engines run up to full throttle in the background as Royal Lao Air Force C-47s prepare to pull troops out of Thakhek West after the successful conclusion of the Battle for Thakhek in November 1965.

tral, safe from the war in neighbouring Vietnam. To that end, the International Control Commission (ICC) was reactivated to oversee the situation. Six UH-34 helicopters were transferred from Air America and painted white, to be flown by French pilots and carrying observers from Poland, India and Canada to investigate alleged breaches of the Protocol by either side.

The USA's Military Assistance & Advisory Group (MAAG) was formed in 1961 from the Program Evaluation Office (PEO), which moved across the Mekong to Thailand, USOM becoming USAID (the US Agency for International Development). North Vietnam claimed that it had never had more than a handful of troops in Laos, and less than 100 of its 7,000 troops dutifully headed homeward past the ICC team on the North Vietnamese border. The rest remained in Laos.

The Americans were not quite as naïve as it may seem. While the notoriously murky PEO had been disbanded, USAID formed a Requirements Office (RO), which would serve as a conduit for military supplies to pro-Western forces. Air America was clearly going to have an increased workload if a bigger conflict ensued. It did, becoming known as the "Secret War".

Five USAF C-123B Providers (N5003X–N5007X) were bailed to the organisation. Bailing was a latter day Lend-Lease arrangement: for a nominal dollar, complete freedom of use of an aircraft was transferred to Air America, with the sole proviso that the aircraft be returned if no longer required — and still in one piece.

The company's first Dornier Do 28s were acquired and a de Havilland Canada DHC-4 Caribou (designated CV-2 in US Army service) was lent on a trial basis from the US Army. Caribous B-851 and B-853 were then obtained new from de

Havilland Canada and several more were later bailed from the US Army. The dangers ahead were driven home when, on November 27, 1962, Provider N5004X was shot down while dropping rice.

In 1963 it was deemed prudent to establish a Flight Information Center, the prime function of which was to maintain an up-to-date plot of anti-aircraft weapon sites and brief crews accordingly. When the author flew in the British embassy's Scottish Aviation Pioneer CC.1 XL665, on detachment from No 209 Sqn, the pilot showed me the red chinagraph pencil marks on his map; there were communist anti-aircraft weapons sited not far east of our hospital in Thakhek.

A slowdown for Air America?

In 1963 it seemed as though the company's workload was decreasing; some UH-34s were transferred to the Royal Lao Air Force as surplus, and the management felt that Air America should perhaps leave Laos, deferring to rivals Bird & Sons in the airlift role. The latter used C-46 Commandos, one load of rice from which could feed 1,000 people for nearly a month. The rice was triple-bagged and dropped on pallets without a parachute from about 800ft. By using up-slopes as drop sites, accuracy increased and the scattering or bursting of bags decreased.

(In 1970 a tipping platform was devised to be fitted to the C-46's side door, so that the "kickers" no longer had to lean dangerously out of the door to the limit of their restraints to release bags, which were also less likely to hit the tailplane).

The Provider crews developed a dramatic drop technique; the entire load was freed, bar one large strap attached to the forward end. The pilot would ring a loud bell when he judged it correct, hauling back on the yoke simultaneously. The copilot





TAH ARCHIVE

ABOVE Seen here with the Civil Air Transport logo on the rear fuselage, de Havilland Canada DHC-4A c/n 52 was given the Taiwanese registration B-853, later shortened to just "853" in Air America service. Used as a commissary aircraft, it operated from Don Muang in Thailand in 1965 and was a regular visitor to Lima sites in Laos from 1966.

would apply full power. As the nose rose steeply, the "kicker" would cut the strap and the entire load would slide down the roller bed and out over the ramp. Any failure by the crew, of either engine or of the load to exit cleanly, would cause a fatal stall. It never did.

The lull was brief, however, and American military aid to Laos totalled some \$14m in 1964. Being low-cost materiel such as rifles, artillery pieces and ammunition, this made up a large tonnage. In 1964 CV-2A Caribous "392" (61-2392) and "401" (61-2401) were bailed to Air America, to be used for hauling petrol drums to suitable strips in the mountains, among other tasks. This allowed helicopters and light aircraft to refuel closer to their own operational areas. With its rear ramp open, the Caribou need not stop; with their restraints undone, the drums were pushed out of the back as the aircraft commenced take-off if time or enemy fire dictated urgency.

A brand new role

With increasing Communist activity, an entirely new role was found for Air America. North American T-28s were coming into use with the Royal Lao Air Force in the ground-attack role. These had to be maintained by Air America engineers at Udorn, in north-east Thailand, there being no suitable facilities in Laos. With the T-28s being American-supplied and often flown (in Lao colours) by

Thai mercenary pilots, it was a small step to make some available for Air America to operate when pinpoint or high-value targets were located. At first five pilots were transferred to T-28 operations, but soon the number doubled, this cadre being named "The A Team". Thai and Lao pilots made up the "B" and "C" teams respectively.

The US Ambassador, Leonard Unger, had to comply with strict rules of engagement for the Air America T-28s, but on July 18, 1964, UH-34 "H-19" was shot down while attempting to rescue the Thai pilot of a Royal Lao Air Force T-28 downed by communist fire. A helicopter crewman was killed in the crash. The Thai pilot was killed by gunfire but Air America pilot William A. Zeitler survived and evaded. With no time to refer the matter to the Chiefs of Staff in Washington DC, Unger took the decision to authorise the "A Team" to use napalm against the communist troops to effect a successful rescue of their colleague. That the Thai pilot was Capt Iriyapong Tavashi (base commander at Udorn and nephew of the Thai Prime Minister) may have been a factor. The US Ambassador's action was retrospectively approved by the US Government and Admiral John S. McCain, Commander-in-Chief of the Pacific Fleet (CINCPAC) was heard to say "Laos is a SECSTATE war", by which he meant one run by the Secretary of State rather than the Secretary of Defense.

Washington further agreed for Air America air-



Air America C-123B Provider N5007X unloads at Luang Prabang in June 1966. Originally built as 55-4555, the aircraft was quickly incorporated into the Air America fleet as "555" and later N5007X. Note the low cloud on the hills in the background. Following its upgrade to C-123K standard with the addition of pod-mounted General Electric J85 jet engines on the wings, this aircraft was lost on August 27, 1972, when it hit a ridge in cloud near Vang Vieng, killing nine.



ABOVE A Royal Lao Air Force T-28 over the author's house at Thakhek after a strafing run on communist positions during the fighting there in November 1965. Note the black band on the undersurface of the wing, painted to make it harder to see if a bomb was still on the rack. Communist troops were bolder once the bombs had been dropped!

craft to be used on an *ad hoc* basis for the rescue of downed American pilots, the company's helicopters often being coincidentally close enough to the downed pilot to effect a quick "snatch" before communist troops arrived. Some 30 USAF and US Navy aircrew owe their lives to Air America, but sadly, of some 700 American personnel missing in action in Laos (unlike the prisoners in North Vietnam itself), none came home in 1975.

Nevertheless, the USAF did what it could for its own pilots over Laos. Apart from the 37th Aerospace Rescue & Recovery Squadron (ARRS), based at Nakhon Phanom in Thailand, close to where the author worked, there were also other Sikorsky HH-3E "Jolly Green Giants" on readiness at Ban Na Khang (LS36) in the far north-east of Laos, near Hanoi. As USAF helicopters lacked air-to-air refuelling capability at the time, it was the only way they could cover the northern part of Laos and North Vietnam. Hence the site was resolutely defended against North Vietnamese attempts to overrun it. Indeed, it became known as "The Alamo".

The Jolly Green Giants could come and go as the action ebbed and flowed, but to Air America pilots in their trusted UH-34s fell the task of replenishing the defenders and their supplies. Ban Na Khang finally fell to the communists on March 1, 1969.

The battle for Sala Phou Koun

By early 1964 General Kong Le had become disillusioned with the communists and had realigned his forces with the Royal Lao Army. As a result, it

was possible — and desirable — to recapture Sala Phou Koun, where Route 7 met Route 13 between Vientiane and Luang Prabang. This would reopen the north-south route and give access east towards the Plaine des Jarres.

Air America inserted and supplied friendly forces to allow a three-pronged attack on the village, while "A-Team" T-28s, controlled by Aero Commander 560 "2714", gave close air support as fighting started on July 22. Both Route 13 and a significant stretch of Route 7 towards Muong Soui were cleared of the enemy. The Aero Commander would have been designated a U-4B had it ever officially been on the USAF inventory. It was reputedly a gift from President Eisenhower to the King of Laos, which has led some sources to claim — erroneously — that it was the aircraft used by Eisenhower to commute from his Gettysburg ranch to Washington DC; the smallest ever Air Force One. In reality Eisenhower's aircraft (55-4647) is on display in the Presidential Gallery of the National Museum of the USAF in Dayton, Ohio.

Aero Commander 560 c/n 214 was initially registered N2714B, thus becoming "2714" in Laos. It bore the Royal Lao Air Force "Erawan" national insignia. During the author's year in Laos, the RLAf seemed to have taken over the use of this aircraft to transport very senior officers and it was based at Savannakhet. It was later returned to Air America, still in RLAf markings, and eventually survived the war to be allocated civil registration N92619, which it never took up.



ABOVE The remarkable STOL performance of the Pilatus PC-6 Turbo Porter made it an ideal candidate for Air America service in Laos. This example, XW-PCL (c/n 583, formerly N13202), begins its take-off run down the slope of Lima Site 20 at Sam Thong in January 1966. It later served with CIA-sponsored Lao airline Boun Oum Airways.

In 1965 Pilatus PC-6A Turbo Porters were introduced in country, and became very popular despite mountain bases having to stock Avtur for the new turboprop-powered aircraft, in addition to keeping stocks of Avgas for the other piston-engined aircraft. Further Dornier Do 28A/Bs also arrived.

The same year, Air America pilots built on the experience of using the Aero Commander by employing Cessna U-17As (military version of the 185 Skywagon), Turbo Porters and even RLAF Cessna O-1 Bird Dogs as forward air controller (FAC) aircraft (with "Butterfly" call signs) for the T-28s flown by the company and the RLAF, the latter never developing its own FAC expertise, perhaps because American forces were keen to do it for them.

In 1966 Gen William W. Momyer, Commander of

the US Seventh Air Force in Saigon, learnt that his own fast jets were being controlled tactically by FAC personnel who were not only non-pilots, but also not even officers (although many had been before joining Air America). Overnight the "Butterflies" were grounded and soon replaced by the more aptly named "Ravens". These were individuals who had completed a tour as forward air controllers in South Vietnam and were offered a chance to volunteer for service in Laos. If they accepted, they were "sold" a Cessna Bird Dog for a dollar and flew themselves to Laos.

At first, there was no maintenance available for their aircraft, Air America later taking the responsibility for them — but not the pilots. As "sheep-dipped" USAF personnel, they were legally self-employed civilians on a contract — mercenaries. In reality their USAF careers continued secretly, in



Aero Commander "2714" at Lima Site 40 — Thakhek West — where it was based during operations against the Pathet Lao in November 1965.

line with their peers, promotion and pension included. This was fine until lives were lost — and many were.

SAR operations

Air America responded to all potential search and rescue (SAR) situations to the best of its ability, but understandably its greatest efforts were expended when one of its own aircraft was down.

On October 13, 1965, soon after the author arrived in Laos, UH-34D "H-32" was reported missing east of Pakse in the south of Laos. Four people were aboard. Immediately every possible asset was deployed for an SAR mission which lasted several days. Initially several Do 28s (including some from rival CASI), Helio Couriers, a Beechcraft Baron and Caribou "853" (the commissary aircraft — the beer and mail would have to wait) were used in the search, but it was a sister UH-34D that found "H-32" the next day.

An Air America C-123B Provider flying overhead provided on-scene co-ordination throughout the search. The Caribou carried Lao paratroops ready to be dropped to secure the area if necessary. Three T-28s flown by Air America pilots were fully armed and on standby at nearby Pakse, although none was needed in the event. Sadly all aboard "H-32" were dead, but the response could not have been bettered by a national air force. Air



America, however, was an airline in name only. In reality, it was an air force.

During 1965–67, flying continued at a brisk pace. Three C-47s — "147" and "994" having joined the veteran "817" — flew the milk runs north to Luang Prabang and south to Pak Sane, Thakhek, Savannakhet and Pakse thrice weekly, while the dozen or so Caribous, Providers and Commandos dropped or landed "soft rice" (food — 7,000,000lb a month, 85 per cent of which was air-dropped) or "hard rice" (weapons and munitions). The UH-34s shuttled small numbers of troops around the mountains for maximum

effect, and joined the many Couriers, Turbo Porters and Do 28s ferrying "customers" (CIA case officers) wherever they needed to go.

The secret base at Long Tieng

Each aircraft down — and there were many — caused a flurry of activity until all personnel were accounted for. Air America-piloted T-28s attacked high-value targets under Raven control, and the B-26 Invader was back, this time in the form of On Mark Marksmen fitted with terrain-following radar (TFR) to perform low-level night drops to surveillance teams working beside the Ho Chi Minh Trail complex. Again, they were found wanting, and were replaced by de Havilland

"As 'sheep-dipped' USAF personnel, Air America pilots were legally self-employed civilians on a contract — mercenaries. This was fine until lives were lost — and many were . . ."

TOP The interior of Caribou "392" en route to Vientiane in April 1966.

BELOW Caribou "392" at Thakhek West on April 18, 1966. The aircraft was serving as a stand-in on the milk run as the regular C-47 had hit a buffalo and was undergoing repair.



Dornier Do 28A XW-PCG (c/n 3026) at Thakhek West in November 1965. Note the dragon motif on the fuselage and a UH-34D, probably of the Royal Lao Air Force, in the background.



Canada DHC-6 Twin Otters (also fitted with TFR).

That the area was lethal was shown when a US Navy surveillance unit equipped with Lockheed OP-2E Neptunes (based at Nakhon Phanom on the Thai border) lost three aircraft (a quarter of its strength) in six weeks. Nightly, Air America C-130 Hercules with Air America crews flew ammunition and other clandestine supplies from Thailand into the Lao airfields bordering the Mekong and up to "Alternate" (Long Tieng, the secret airbase) in the mountains. Up to 280 armed Lao troops could be carried at once, owing to their small stature and the crews' disregard for weight limitations.



NEXT TIME — Air America in Laos, 1967–74: The Tet Offensive and its aftermath

■ The author would like to thank Dr Joe F. Leeker for his help during the preparation of this feature

Air America & the Skyhook

THE CARIBOU TOOK on a new role in 1965 when Air America acquired two sets of Fulton Skyhook equipment to permit the pick-up of agents or downed aircrew by an airborne aircraft. A pack containing a helium cylinder and a balloon with a harness attached (by a long stretchable rope) was dropped to the downed crewman. Once he was attached by the line to the inflated balloon aloft, the aircraft would snag the rope between two nose-mounted prongs aimed just below the balloon. Alarming, the crewman left the ground vertically initially before being trailed behind the aircraft until winched into the open rear doors. Whether Air America actually ever used this equipment remains difficult to clarify, but the role was probably taken over by the USAF as at least two Hercules with Skyhooks (as **BELOW**) were seen at Udorn in 1966.



HUNTERS OVER THE ANDES



MAIN PICTURE All 16 of the batch of Hunter single-seaters ordered as Mk 52s by Peru in September 1955, photographed at Limatambo in May 1956. The aircraft were all ex-RAF Hunter F.4s and the Peruvian sale — the first order for Hunters from a country outside Europe — was something of a coup for Hawker, the USA having saturated the South American market with surplus North American F-86 Sabres and Lockheed F-80s and T-33s.



*In early 1956 Hawker test pilot **DUNCAN SIMPSON** — soon to be fêted in South America as “the best test pilot in Europe” — was tasked with overseeing the introduction of the Hunter Mk 52 into Peruvian Air Force service. Despite being favourably impressed by the Peruvians’ ingenuity and airmanship under somewhat demanding conditions, he recalls why it was still “five of the most difficult and frustrating months of my life . . .”*



ABOVE The author, seen here in full flying kit with a Peruvian officer at Limatambo, joined Hawker in 1954 from the RAF’s Air Fighting Development Squadron, part of the Central Fighter Establishment at West Raynham. He went on to become one of the most distinguished test pilots of his generation, retiring from Hawker Siddeley Aviation as chief test pilot in 1978.

BY LATE 1955 the first of the reconditioned ex-RAF Hunter F4s purchased by Peru, designated Mk 52s, were ready to be delivered, so at the beginning of March 1956 I started preparing to depart for South America, where I was to oversee the assembly of the aircraft and train the pilots of the *Fuerza Aérea del Perú* (Peruvian Air Force — FAP) to fly them.

I flew out to Lima on March 8 via the North Atlantic route in a BOAC Boeing Stratocruiser — my first experience of civil flying, and a long drag. Fortunately I had a bunk and I slept well en route for New York. Thence by Panagra [Pan American-Grace Airways] Douglas DC-7 via Washington DC, Miami and Panama to the Peruvian capital, where I was met by Hawker's assistant service manager Len Hersey, five Hawker engineers and the company's South American agent, Luis P. Navarro.

I had started five of the most difficult and frustrating months of my life — which would provide useful experience for the years ahead!

Peru buys British

The Hunter Mk 52 was essentially the same as the RAF's F4 and was sold to Peru to achieve a political target date of being in service with 16 aeroplanes by Peru's Independence Day on July 28, 1956. At the time the FAP was entirely American-equipped, its front-line fighter force comprising a couple of squadrons of North American F-86F Sabres.

Most of the American equipment had been supplied as "aid" and there were most definitely strings attached. There were American servicemen everywhere, and I had no doubt that they had a big say in the FAP's flying and technical activities. Happily for us, an element of the FAP had decided in 1955 to buy British — 16 Hunters and eight English Electric Canberra B(1).56s — with the aim of becoming

less dependent on American help and influence.

Very quickly I began to learn how business was done in South America — Navarro was obviously a very rich man and had no doubt made a fortune out of the Hunter deal. He in turn had to look after various government and military officers — and all expected their part of the "commission".

It was therefore obvious that not everybody in the FAP wished to have the Hunter; Gen Manuel P. Garcia, the Minister of Defence, was all for it, but the senior officer of the procurement group, General van Oordt, was most definitely not! On several occasions I was asked to go to his office, where there was always an American captain in attendance, who professed to have known me in the UK. The Hunter Mk 52, in order to meet the political in-service date, had been sold without the essential gun-firing modifications to the aeroplane and engine having been incorporated. Indeed, trials were still ongoing in the UK at the time. So the obvious questions were being asked and I had a fairly rough ride with van Oordt.

We were held up from flying for five weeks after my arrival owing to lack of suitable fuelling arrangements, which did not help. During the delay I became something of an expert in fuel filtration and learned much about the Hunter that I did not know — and a lot more about human nature and South American politics.

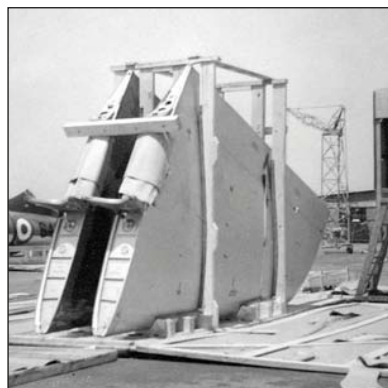
The mother of invention

This was the first occasion on which Hunters had been shipped overseas; those delivered to Nato countries were assembled in Britain and flown to their new owners. There were, inevitably, difficulties in Peru. The assembly line was a stretch of tarmac with an open-fronted hangar to house the stores organisation. The crates in which the aircraft had been delivered had to be pressed into service to make benches and shelves for the stores.

The policy followed was to open the cases and leave the dismantled units of the aircraft on the

The author taxis out at Limatambo for the first flight of the first completed Peruvian Hunter, 635, on May 18, 1956. The flight lasted 50min and the aircraft was taken up again later the same day for a 45min flight.





TOP LEFT Box fresh — each Hunter was dismantled and packed into four boxes for shipping to Peru. Seen here outside the hangar at Limatambo are two tall boxes containing wings and a smaller fuselage box. **TOP RIGHT** The wings in their supporting structure after the tie-beams of the box had been severed. The wings would then be laid over on to beams on the ground, to be picked up with slings for mounting. **ABOVE** The centre fuselage and nose section with the case opened. The boxes were packed with great expertise in the UK by Messrs R. & J. Parks.

wooden formers in their cases until such time as the team was ready to assemble them in their correct sequence. By this method they were able to conserve their limited supply of ground equipment and at the same time carry on assembling the units. This applied more to the rear fuselage than any other item. It was possible to assemble the fin, rudder, tailplane and elevator to the rear fuselage while it was still on the ground and the only time the rear fuselage trolley was used was when the complete rear fuselage was offered up to its aircraft. Assembly proceeded on the six aircraft in such a way that it was possible to lay down a production line principle, and one or two men were able to follow through the same operation on all 16 aircraft.

The first six Hunters had arrived at the port of Callao in the third week of February 1956 and were taken by road to Limatambo Airport, in the San Isidro district of Lima. A second shipment of four aircraft arrived at the airport on March 21–22.

By mid-April I was ready to begin the Hunters' test-flying programme. It was a critical moment. Limatambo was essentially a civil airport and the loose gravel surface of the runways was hardly ideal for jet aircraft, although its length of 2,000yd (6,000ft — 2,200m) was adequate. Both runways were flanked on either side with a flourishing cotton crop, and the undershoot and overshoot areas had their share of obstructions, including a 10ft (3m)-high brick wall at one end.

I could afford to wait until the weather conditions were good to start the flying programme — which was just as well, as there were no navigation aids and no radar. Eventually, on April 18, 1956, I made the first flight of the first of the 16 Hunter Mk 52s, from Limatambo airport. The test flying was quite straightforward and by the end of May I had completed and handed over six aircraft. My work did not stop with the final flight tests of the aircraft, however; the Peruvians had to be trained to fly them.



LEFT Hawker and FAP personnel at Dunsfold in 1955 during the latter's familiarisation flight programme. Left to right: Hawker production test pilot Don Lucey; unknown; E.H. Jefferson Sr (Production Manager at Kingston); Col Fernando Paraud; Hawker's Sales Manager for South America Tim Wills and Lima agent Luis Navarro.

RIGHT Members of the Peruvian Arsenal work on the tailplane of 631. The author recalls: "By any standards they were excellent workmen and soon obtained a complete grasp of operations".

INSET BELOW A contemporary caricature of the author by renowned illustrator and cartoonist E.A. "Chris" Wren.

Typical British weather

On May 22, Peruvian pilots made six flights in the new fighters, led by the Group Commander, Col Fernando Paraud, a likeable rogue who had previously flown a 20min sortie in a Hunter at Dunsfold. He and his colleagues, *Mayor* Leon Melgar and the Flight Commander and senior pilot, *Capitán* Alberto Thorndike, very soon completed the conversion course and later flew each aircraft on an official acceptance check.

I had to do all the briefing; fortunately the standard of pilots, who were all trained in the USA, was high.

Although most of the Peruvian pilots spoke English fluently, it was found more satisfactory to run through each lecture in detail with their commanding officer and let him answer questions in the pilots' own language.

During this time the *Pilot's Notes* and all the aircraft servicing manuals were translated into Spanish by the squadron pilots and engineers, resulting in a beautifully-finished flying manual covering not only the pilots' notes but instruction on equipment and powered flying controls.

The most disappointing part of being in Peru at that time of year was the weather. From early May onwards the sun was obscured for most of the day by a cloud layer extending up to about 2,500–4,000ft (1,050–1,200m). Owing to the temporary absence of radio compasses in the aircraft, instrument let-downs were made by a method worked out in discussion with the senior Peruvian pilots, and which was in fact safer than it sounds.

Flying above the clouds, the procedure was to

set course from one of the Andes foothills known as Cerra Colorado, the top of which was 8,000ft (2,400m) above sea level. A standard pattern was then flown and an overhead position at Limatambo was cross-checked by the relative position of three other known mountaintops and from a portable direction-finding (D/F) radio set operated by one of the Hawker engineers. In practice the D/F set was subject to various

inherent failings, whereas the mountains had long been noted for their reliability. It need hardly be added that to make full use of the latter facility one required a good knowledge of the local Andes!

From the overhead position, the pattern was confirmed and contact was made about two miles (3km) off the coast.

The method proved very accurate owing to the light south-westerly winds prevailing and worked well in conjunction with civil approach procedure.

The last batch of six aircraft had meanwhile arrived at Limatambo on May 5, and by uninterrupted work were made ready by the end of the month. Enough aircraft had been handed over to the FAP for a ceremony to be held on May 30 to inaugurate *No 14 Escuadrón de Caza* (Fighter Squadron) at Limatambo. How the South Americans love an occasion like this! Most of the FAP was involved, the airport was closed and the Peruvian President, Manuel Odría, presided. The British Ambassador appeared and everyone who had a good excuse and who was considered important enough attended.

All 16 Hunters, whether they had flown or not,





ABOVE In bow tie and white linen suit and with pipe firmly gripped in his teeth, Rolls-Royce representative Jock Gaskyn supervises the installation of an Avon Mk 115 in one of the Hunters at Limatambo. In the background is one of 20 Republic F-47D Thunderbolts supplied by the USA to Peru as fighter-bombers in 1947 as part of the Rio Pact.



LEFT *The author enjoying a glass of champagne alongside Col Paraud (second left) and the Peruvian President, General Manuel Odría (centre), at the Hunter squadron's formation celebrations in May 1956.*

RIGHT *A line-up of four of the Mk 52s at Limatambo, with the Andes rising in the background. In a 1980 letter to the author, Peruvian Hunter pilot Julio Leon Melgar wrote: "We enjoyed flying our Hunters and for me it is still the best 'plane I ever flew—including the Mirage".*

were lined up outside the main airport terminal for the President's inspection. He was accompanied by Minister of Defence Garcia and all his senior Generals, and was briefed on the aircraft; he took particular interest in the 30mm Aden gun pack.

After the inspection, three aircraft took part in a formation flypast led by Paraud. I then got airborne in Hunter "640" and gave the best demonstration that I could muster. I confess I was slightly concerned about the possibility of a birdstrike, so I performed a high-speed run to clear the vultures away. It all went down well and produced some glowing reports in the local press the following day (see page 55).

The conversion programme

In the first week of June it was decided to begin training the squadron pilots. The aim was to have them flying the Hunters in a flypast for Peru's

traditional Independence Day celebrations on July 28. The task was certainly a formidable one.

Each training sortie was carefully planned in advance and the pilot received a printed card bearing full information on the conversion flight he was about to undertake. The programme was planned each evening for the following day, and amended according to the weather if necessary. At an early morning briefing the senior pilot explained each day's flying programme and discussed with the pilots under instruction any problems from the previous day. In addition squadron pilots were chosen at random to explain one flight emergency at each briefing.

A chase aircraft flown by Paraud, Melgar or Thorndike accompanied each pilot on his first and second flights, so that the less experienced aviators could concentrate on flying the aircraft rather than on the Cerra Colorado let-down, which

President Odría inspects his air arm's new interceptors on May 30, 1956, before presenting the new squadron with its War Standard in the presence of various American and British diplomats and chiefs of the FAP.





was usually needed at the end of each flight.

While supervising pilot conversion I continued to fly the aircraft after they were assembled. I did enjoy being let loose from the daily frustrations at Limatambo. I had to take infinite care over the test flying; the luxuries at Dunsfold just did not exist in this fascinating environment. Usually I would climb to 50,000ft to the south, with the Andes to my left and the Pacific Ocean to the right, ending up overhead the settlement of Pisco. In the event of problems arising I had no emergency retreat, apart from returning to Limatambo. I usually took time off at the end of each test flight to fly out over the Andes, the massive mountains rising to 20,000ft. Unlike the Alps, the snow level was very high, so the mass of mountains appeared to be a variety of shades of brown rock stretching as far as the eye could see. Frequently I could see signs of human building in the most remote and

inaccessible places — possibly Inca remains.

On June 7 a squadron pilot made his first solo flight and by mid-July all the pilots had completed their conversion courses and begun formation training. Despite the difficult conditions the entire task of conversion was accomplished at the negligible expense of one tail bumper. A more serious accident occurred during formation flying when the wingtips of two aircraft touched. Both landed safely, however, with damage confined to the port wing of one and the starboard wing of the other. By putting both intact wings on to one aircraft, it was possible to have 15 of the Hunters serviceable for participation in the flypast.

Independence day

I continued converting the pilots and testing the remaining aircraft until July 11, when all aircraft were handed over to the FAP in good order. All





ABOVE Four Peruvian pilots in the flying gear that caused the author such headaches. Although it is not certain who these individual pilots are, a four-man formation team — the Four Aces — was formed in September 1956, comprising Julio Leon Melgar, Hernan Boluarte, Alberto Thorndike and Chilicuto Hernandez; this may be them.

efforts were then devoted to the upcoming mass flypast on the 28th. There were several problems to be overcome, apart from ensuring the maximum number of Hunters on the line.

One of the most unlikely and serious problems involved the non-arrival of the pilots' personal flying equipment — helmets, oxygen masks, radio connections etc. Where were they? I spent hours in the airport terminal searching through the incoming air freight. I could see that desperate measures would have to be taken; telexes to Hawker at Kingston were producing no result. At the last moment the consignment arrived, just in time for one rehearsal.

On the day, 15 Hunters took part in the mass flypast of Canberras, Sabres, Lockheed T-33s and all available operational aircraft over the city of Lima. I decided to accept a private arrangement with Flt Lt David Dowling of the RAF, the exchange instructor on the Canberra, to fly with

him in a B(I).56. We were the very last aircraft in the flypast and reckoned that if it started looking dicey we could disengage safely!

To David and me the whole performance was a near-shambles; the method of forming up was to circle an island south of Lima and then launch the whole formation across the city. This actually worked well, the formations being "stepped down" from the leaders. Thus by the time it got to us in the last aircraft we were at extremely low altitude and I recall seeing the buildings passing either side and well above us! Reportedly, the President was so pleased he remarked: "Splendid! Do it again, and LOWER!" The second pass was decidedly exciting but David held on and we completed the run.

That year's Independence Day was especially significant as it coincided with the election of the new President, Dr Manuel J. Prado. During the eight years of office of the outgoing President,

Fighter aircraft ancient and modern — a Hunter is prepared for flight alongside an F-47D of fighter-bomber unit Escuadrón de Caza (EC) 13, the FAP's F-86F Sabres operating with EC 12.



THE PERUVIAN AIR FORCE IN 1956

AT THE TIME of the delivery of its Hunter Mk 52s in 1956 Peru's air force was comparatively small, but its combat equipment was among the most modern in South America. The Peruvian Government had long shown a keen interest in military aviation, dating back to before the First World War, and with the help of the USA's post-Second World War Mutual Defense Assistance Program (MDAP) and purchases from the UK, it was able to build a modern and well-balanced air arm able to fulfil the nation's obligations to the Inter-American Treaty of Reciprocal Assistance signed in Rio de Janeiro in 1947 (a "Nato of the Americas" known as the Rio Pact).

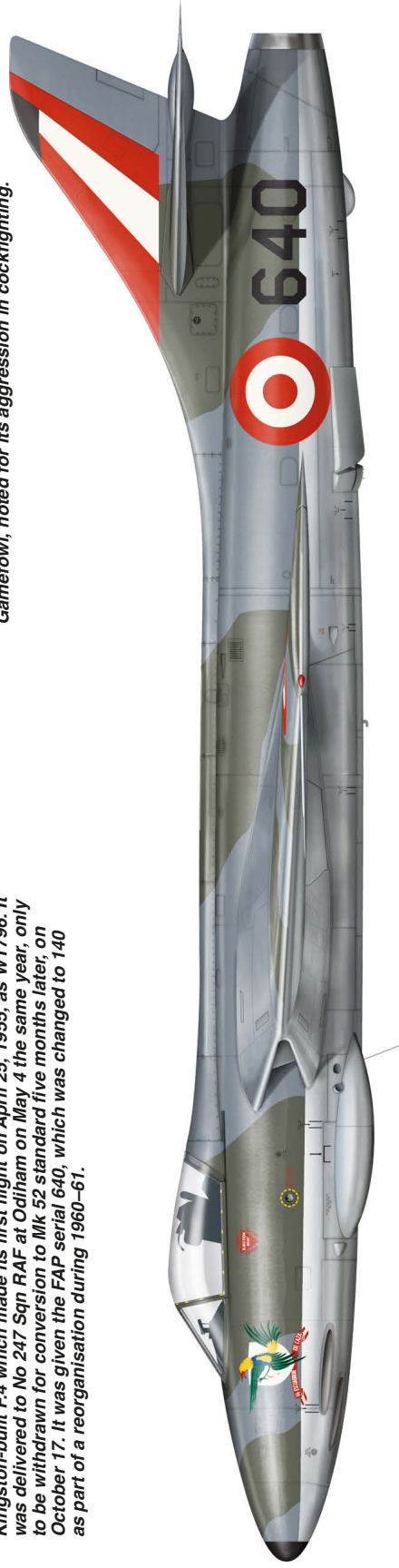
In 1955 an extensive modernisation programme began, Peru receiving, under the provisions of MDAP, Douglas B-26 Invaders, Lockheed T-33s and North American F-86F Sabres from the USA, as well as Hunter Mk 52s and English Electric Canberra B(I).56s from the UK, which supplemented its front-line force of older types, which included North American B-25Js and Republic F-47D Thunderbolts. Other types on strength with the FAP in 1956 were the Lockheed PV-2 Harpoon and Consolidated PBV-5A Catalina.

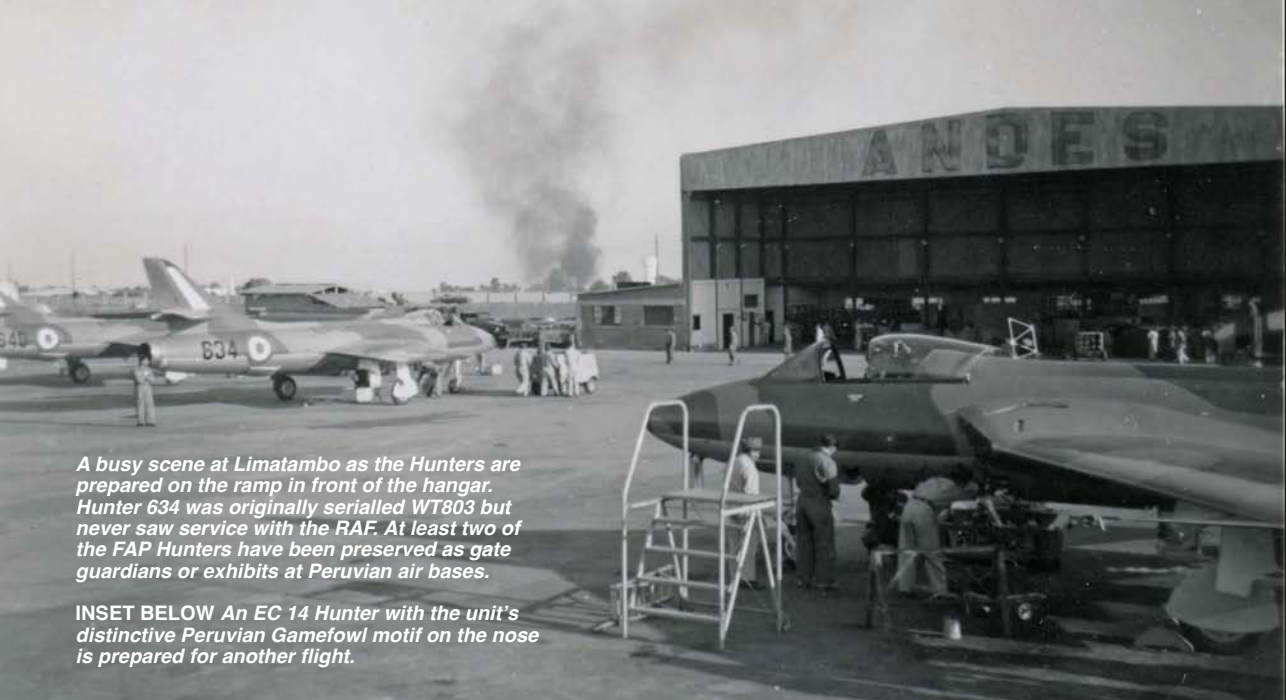


All artwork by JUANITA FRANZI/AERO ILLUSTRATIONS © 2013 WWW.AEROILLUSTRATIONS.COM

BELOW Hunter F.52 640 of the Fuerza Aérea del Perú, was originally a Kingston-built F.4 which made its first flight on April 25, 1955, as W7796. It was delivered to No 247 Sqn RAF at Odiham on May 4 the same year, only to be withdrawn for conversion to Mk 52 standard five months later, on October 17. It was given the FAP serial 640, which was changed to 140 as part of a reorganisation during 1960–61.

ABOVE Escuadrón de Caza 14 was formed at Limaambo on May 30, 1956, specifically as the Hunter component of Grupo Aéreo 14 (12 from 1957), the unit sporting a nose badge incorporating a Peruvian Gamefowl, noted for its aggression in cockfighting.





A busy scene at Limatambo as the Hunters are prepared on the ramp in front of the hangar. Hunter 634 was originally serialised WT803 but never saw service with the RAF. At least two of the FAP Hunters have been preserved as gate guardians or exhibits at Peruvian air bases.

INSET BELOW An EC 14 Hunter with the unit's distinctive Peruvian Gamefowl motif on the nose is prepared for another flight.

Gen Odria, the FAP had been re-equipped with the most up-to-date British and American jet aircraft and those which took part in the celebrations left no doubt as to the capabilities of the Peruvian pilots. The day after the flypast the press contained the text of a telegram of congratulation sent by Air Chief Marshal Sir Dermot Boyle to the Peruvian Air Minister.

Homeward bound

At the end of July four of the Hawker engineers bade farewell to Peru, the fifth remaining as the firm's representative. Their achievement was one of which they might well be proud. A total of 16 aircraft had been assembled in four and a half months under conditions which were far from ideal. The work had been done in the open air in everything from tropical heat to cold heavy drizzle.

Equal credit is due to the civilian engineers from the FAP Arsenal, who were drafted in to assist in the work. The facilities of the Arsenal were placed at the disposal of the British engineers for any repairs that were necessary. No job, however small or large, was beyond their capabilities and the standard of workmanship was of the highest order.

Language difficulties, resulting from the British attempts to learn Spanish and the Peruvians simultaneously learning English, did not present any problems which spontaneous good humour on both sides could not solve. The co-operation

between both parties resulted in trouble-free test and service flying which was a credit alike to the Peruvian civilian and service engineers and to the Hawker and Rolls-Royce team.

I continued with the FAP for the following month, but it became obvious that it would be unnecessary — and indeed inappropriate — if I remained in Peru for much longer. But there was a clause in the contract stating that I was to stay for “up to one year” — and in Peruvian eyes this meant one year. Eventually I persuaded Tim Wills, the Hawker representative in South America, and Navarro to meet Minister Garcia to get him to agree that I should return to the UK with a view to a further visit when the two-seat Hunter was delivered and for gun-firing trials. So I headed back to Dunsfold via Panama, Miami, Washington DC and New York on August 4–6, 1956.

On my return to the UK I described my Peruvian adventure in the December 1956 edition of the *Hawker Siddeley Review*, the company's in-house journal, ending the article with the following summing-up of my time spent in the Andes and the Peruvians it had been my pleasure to get to know while there:

“One did not need to know the language to realise their enthusiasm over their new aircraft. To have worked with them was indeed a pleasure, and I look forward to hearing more of them in the future.”



WHAT THE PAPERS SAID . . .

THE FOLLOWING REPORT was published in the Peruvian daily newspaper *La Prensa* on Wednesday, May 31, 1956:

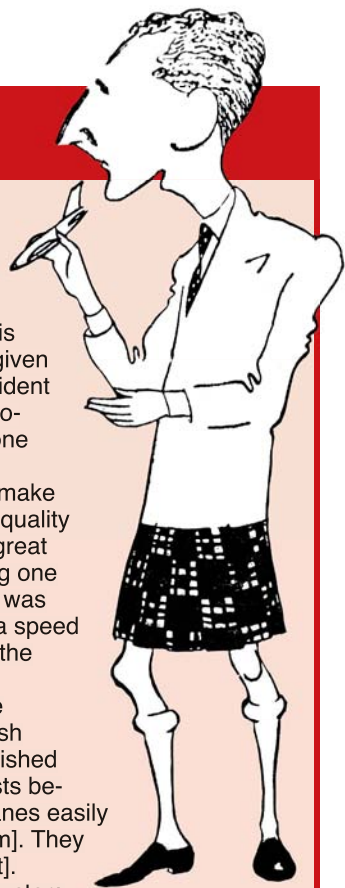
English Pilot Gave A Great Air Exhibition

One of the greatest exhibitions of aerial aerobatics took place yesterday in a jet 'plane, flown by the English test pilot Duncan Simpson, who is considered to be the best test pilot in Europe. After the Air Minister had given his speech at the handing over of the new jet 'planes, and after the President presented the War Standard to this group of 'planes, an exhibition of aerobatics took place which, in spite of bad weather at the airport, left everyone present spellbound.

For 20min the English pilot gave evidence of the great qualities which make him the most famous pilot in Europe and which proved the manoeuvring quality of these machines in the air. After doing the famous looping-the-loop at great velocity, he did a "turneau" in four movements, which consists of lowering one wing, mathematically forming an angle of 45°. At one moment the public was alarmed when the 'plane passed at only 40m [130ft] from the ground at a speed of 400km/h [250 m.p.h.] [sic]. In this manoeuvre the English pilot proved the power of the engine. *[It is more likely to have been 400 m.p.h. — Ed]*

A few weeks ago the Peruvian Government bought jet 'planes from the Hawker factory in England. The machines were sent in boxes. Ten English technicians came to Lima to direct the assembly, which has just been finished with the help of Peruvian staff. According to official data, each 'plane costs between 6,000,000 and 7,000,000 *soles* and weighs five tons. These jet 'planes easily break the sound barrier when they are at an altitude of 40,000ft [12,190m]. They are 13–14m [43–45ft] long and the engine alone takes up 3–4m [10–12ft]. According to the account given by a reporter during the exhibition, the Hunters are fitted with additional petrol tanks which allow them to cover the distance, going or coming, from Lima to Piura in only two hours.

After the British test pilot Simpson had given the aerobatic exhibition, three other 'planes took part, flown by Peruvian pilots Col F. Paraud, Mayor Leon Melgar and Capt Alberto Thorndike, who flew in formation for the first time in Peru without having practised beforehand for this type of demonstration. The public applauded these four pilots incessantly. After the ceremony and demonstration was over, the President of the Republic, accompanied by the Air Minister, and his party passed to the dining room of the airport, where they were served champagne.

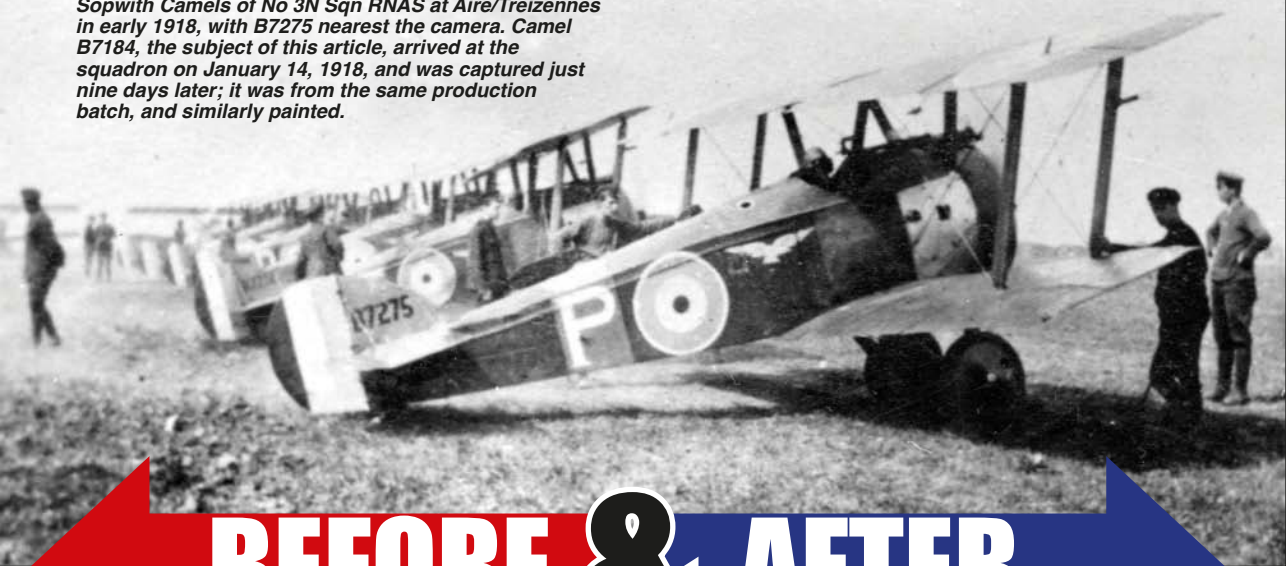


ABOVE
"Supersónico" —
accompanying the
report in *La Prensa*
was this caricature of
the author, complete
with kilt reflecting
his Scottish heritage,
holding a jet fighter.

A poor-quality but extremely rare photograph of the author performing aerobatics and low-level runs at Limatambo in May 1956.



Sopwith Camels of No 3N Sqn RNAS at Aire/Treizennes in early 1918, with B7275 nearest the camera. Camel B7184, the subject of this article, arrived at the squadron on January 14, 1918, and was captured just nine days later; it was from the same production batch, and similarly painted.



BEFORE & AFTER


ROGER TISDALE and ARVO VERCAMER introduce a new series in which they profile both the original and new markings of aircraft that have fallen into enemy hands — first up is a Sopwith Camel, captured in France in January 1918

FEW WOULD HAVE thought, as they watched designer Herbert Smith's diminutive biplane fly for the first time just before Christmas 1916, that the aircraft later christened Camel would become part of aviation folklore.

The Sopwith F.1 prototype, powered by a 110 h.p. Clerget 9Z engine, was the first of some 5,500 Camels built by numerous contractors during the Great War. Renowned historian Jack Bruce noted that "its sensitivity to the controls made it the supreme dog-fighting machine" and that the Camel, "in the right hands, was a lethal weapon".

Clayton & Shuttleworth-built Camel B7184 had been in service on the Western Front with No 3N (Naval) Sqn of the Royal Naval Air Service (RNAS)

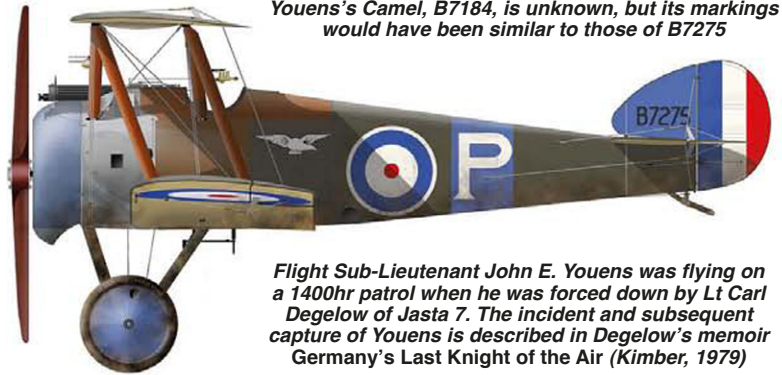
just a matter of days before it was forced down west of Zarren in western Flanders while being flown by Flt Sub-Lt John E. Youens on an afternoon patrol on January 23, 1918, by *Leutnant* Carl Degelow of Jasta 7. Acquired by Lt Otto Kissenberth, CO of Jasta 23b, the Camel was painted in the black-and-white colours of his unit and given distinctive *Balkenkreuz* markings.

Kissenberth flew the Camel in combat, shooting down an S.E.5a of No 64 Sqn RAF on May 16, 1918, for his final victory of the war. The Camel had its revenge when the engine failed on take-off on May 29, Kissenberth sustaining injuries that ended his flying career. 

After — Camel B7184 in its new colours after having been acquired by Lt Otto Kissenberth, who, unusually, wore spectacles when flying.

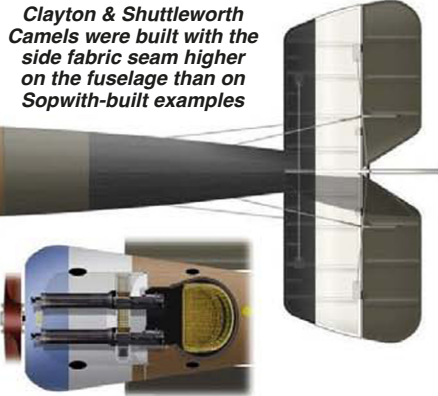


The Camel illustrated in the side-profile below, B7275, is based on the photograph opposite of a line-up of No 3N (Naval) Sqn Camels in 1918. The flight letter of Youens's Camel, B7184, is unknown, but its markings would have been similar to those of B7275



Flight Sub-Lieutenant John E. Youens was flying on a 1400hr patrol when he was forced down by Lt Carl Degelow of Jasta 7. The incident and subsequent capture of Youens is described in Degelow's memoir Germany's Last Knight of the Air (Kimber, 1979)

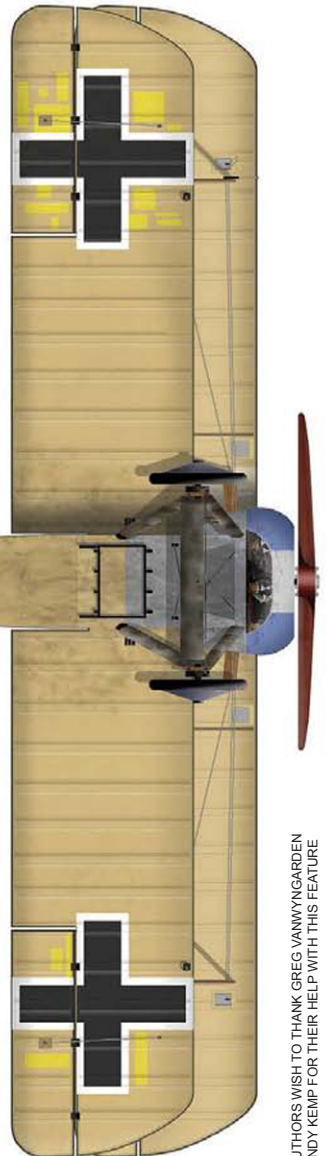
Clayton & Shuttleworth Camels were built with the side fabric seam higher on the fuselage than on Sopwith-built examples



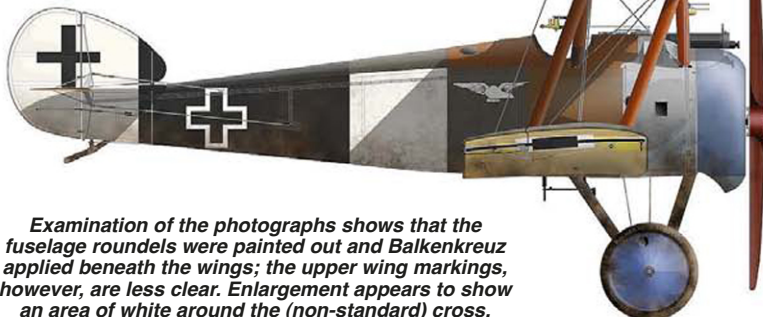
ABOVE LEFT The twin Vickers guns and cockpit detail



Kissenberth had the tail of the Camel painted in the black-and-white Staffel colours of Jasta 23b but retained the original RNAS eagle emblem on the fuselage



The upper surfaces of the elevators are shown here painted in standard RNAS PC10, but they may have been the same blue as the cowlings, fin and wheel covers



Examination of the photographs shows that the fuselage roundels were painted out and Balkenkreuz applied beneath the wings; the upper wing markings, however, are less clear. Enlargement appears to show an area of white around the (non-standard) cross.

SEKANI



Having achieved great success with its single-engined bush aircraft of the 1920s and 1930s, the Canadian subsidiary of Fairchild began exploring the possibilities of a twin-engined land- or floatplane for bush and photographic operations. Despite the resulting aircraft introducing a number of innovations — the first aircraft of Canadian design to have a retractable undercarriage, for example — it was a disaster, as **NICK STROUD** explains

Only two Fairchild 45-80 Sekanis were made, CF-BHD and CF-BHE, both built at the company's factory on the St Lawrence River at Longueuil, opposite Montreal. This is the prototype moored on the St Lawrence in 1937.



BY 1937 FAIRCHILD Aircraft Ltd, the Canadian subsidiary of the Maryland-based Fairchild Aviation Corporation, had made great strides in opening up the inhospitable far northern reaches of Canada with its high-wing single-engined cabin monoplane aircraft. Designed to be rugged and reliable, Canadian-built FC-2s and Model 71s and 51s were used by both commercial operators and the Royal Canadian Air Force (RCAF) to explore the vast expanses of the Canadian bush, and provide services to remote mines that had previously been inaccessible without a long and often treacherous trek.

Having obtained such success with single-engined types, the natural progression for Fairchild was to design and build a twin-engined bush aircraft, the logic being that it would be capable of carrying twice the load over twice the distance at twice the speed. The result, however, turned out rather differently.

Vanderlipp's folly

In 1936 Nathan Floyd Vanderlipp resigned from his job at Bellanca in New Castle, Delaware, to take up his new position as General Manager and Chief Engineer at Fairchild's factory at Longueuil on the south shore of the St Lawrence River, opposite Montreal. Vanderlipp's first design was to be the 45-80, a large twin-engined aircraft intended solely to serve bush operators. Several



sources claim that Vanderlipp's starting point for the new machine was a design from the "Lower 48", the Timm T-S140 twin, for which he had reportedly acquired the design rights, although this has never been officially verified. Working alongside Vanderlipp on the 45-80 was Canada's first female qualified aeronautical engineer, Elsie MacGill, who had established herself at Fairchild during the production of the company's Super 71 and 71P bush aircraft.

By the late spring of 1937 the new design had been built, given the registration CF-BHD and made ready for its first flight. Of high-wing-plus-stub-wing or sub-sesquiplane configuration, the 45-80 was named Sekani after an indigenous Canadian mountain tribe and was powered by a pair of 400 h.p. Pratt & Whitney R-985 Wasp Junior engines. The new machine could be fitted with a wheeled or float undercarriage.

The fuselage was fabric-covered and constructed of chrome-molybdenum steel tubing; it incorporated a cabin 17ft (5.17m) long x 57in (1.45m) wide x 60in (1.52m) high. The fabric-covered mainplanes had solid spruce spars with metal ribs, and were connected to the stub wings by means of N-struts which passed through the engine nacelles on the mainplanes. The stub wings were of heavy steel construction and incorporated the main fuel tanks. The land undercarriage was retractable — the first on a Canadian-designed aircraft — and was arranged to fold back under the stub wings, the float

ABOVE Fairchild designer *Elsie MacGill*, who, before being tasked with helping Nathan Vanderlipp on the 45-80, had played a major part in a number of Fairchild designs, including the Super 71, the prototype of which, CF-AUJ, is seen **BELOW**.





ABOVE Somewhat underpowered, the Sekani was fitted with a pair of nine-cylinder Pratt & Whitney R-985 Wasp Juniors, these being a smaller version of the same company's R-1340 Wasp. The Sekani's powerplants were fitted with NACA heavy-gauge aluminium alloy cowlings equipped with nose shutters to provide temperature control. The Wasp Junior was used more successfully on the Beech 18, Vultee Valiant and de Havilland Canada DHC-2 Beaver.

undercarriage being fixed beneath the stub wings. The fabric-covered ailerons were of all-metal construction and the tail surfaces were constructed of welded steel tubing, also covered with fabric. The new machine was designed to carry ten passengers and two pilots.

Into the air

On August 24, 1937, Fairchild test pilots Alec Schneider and Jules Sesia took the Sekani on its maiden flight, during which the aircraft displayed a host of unpleasant characteristics, the most serious being an aerodynamic overbalance of the rudder that caused the pilots considerable difficulty in maintaining control. On alighting, the rudder pedals were bent from the pressure Schneider had been forced to apply during the flight, and the balance portion of the rudder was found to be badly distorted. It was not the only thing bent out of shape. Reportedly, after taxiing the aircraft to the dock, Schneider jumped out of the aircraft and chased Vanderlipp into the hangar brandishing a starting-handle!

In the autumn of 1937 Wilfred Leigh Brintnell, the owner of Edmonton, Alberta-based Mackenzie Air Service (MAS), visited Longueuil to inspect the airline's prospective new machine. To his dismay, Brintnell, a former Royal Flying Corps pilot responsible for numerous record-setting flights in Canada during

1928–31, was not permitted to fly the Sekani, presumably as the initial flight problems had not yet been ironed out. When the machine was flown to Edmonton for evaluation by Mackenzie shortly afterwards, Brintnell and an MAS pilot found, to their horror, that the tailplane was deflecting some 10in during even the mildest of turns. They quickly brought the aircraft back to earth for fear of losing the tailplane altogether during anything more than a shallow turn.

The second Sekani, CF-BHE, was fitted with skis and flown to Edmonton by Schneider and Fairchild engineer S.J. Griffith in early 1938, for delivery to MAS, but the airline refused to accept it and had it returned to the factory, wanting nothing more to do with the attractive but overweight and unstable aircraft.

Military trials

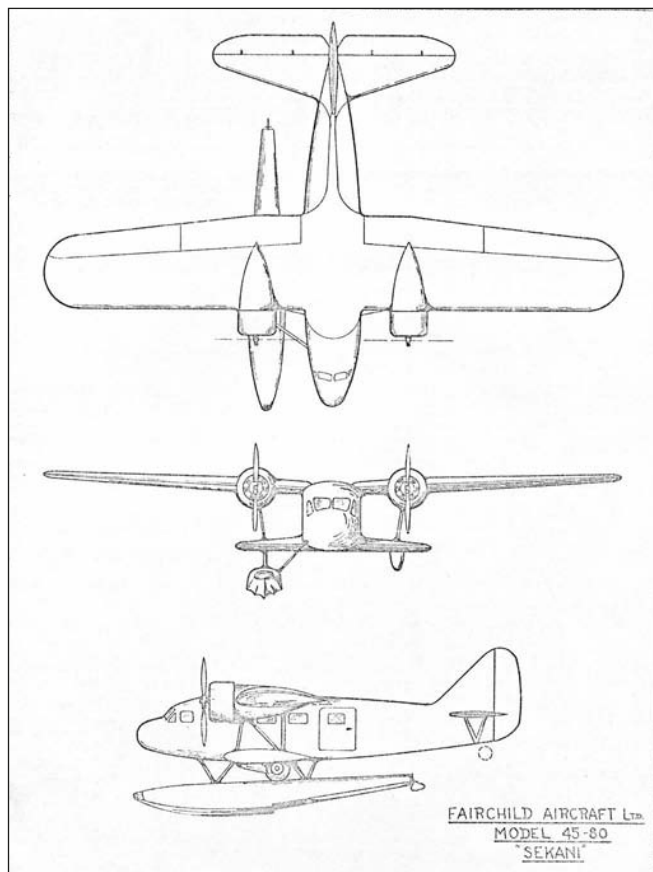
At the same time as the Sekani was failing to impress Brintnell at MAS, the RCAF sent four officers — Wg Cdr A.B. Shearer, SqN Ldr C.R. Slemon and Flt Lts R.C. Hawtrey and L.E. Wray — to investigate the possibilities of the Sekani as a military transport and photographic reconnaissance machine.

The group's report was submitted on October 21, 1937, noting that its positive attributes included acceptable take-off and alighting characteristics, effective flaps and good handling on the water. The report also noted, however, that the aircraft was





ABOVE The Sekani's cabin volume was approximately 450ft³, and several internal configurations were proposed: a freighter with a plywood floor; a dedicated bush aircraft with bench-type seats; a photographic aircraft with a hole cut in the cabin floor and a darkroom or a standard passenger aircraft for up to ten passengers and their luggage. **BELOW** A slightly rough but rare contemporary Fairchild company general-arrangement drawing of the Sekani.



FAIRCHILD 45-80 SEKANI DATA

Powerplant 2 x Pratt & Whitney R-985 Wasp Junior air-cooled radial engines, rated 400 h.p. at 2,200 r.p.m./5,000ft

Dimensions

Span	57ft 0in (17.4m)
Length	39ft 2in (11.94m)
Height	11ft 11in (3.6m)
Wing area	450ft ² (41.8m ²)
Tailplane area	44ft ² (4.1m ²)
Fin area	10ft ² (0.93m ²)
Track	13ft (3.96m)

Weights

Empty	
(Landplane)	6,100lb (2,767kg)
(Seaplane)	6,850lb (3,107kg)
Loaded (both)	10,000lb (4,536kg)

Performance

Max speed	
at sea level	
(Landplane)	187 m.p.h. (301km/h)
(Seaplane)	167 m.p.h. (269km/h)
at 5,000ft	
(Landplane)	202 m.p.h. (325km/h)
(Seaplane)	180 m.p.h. (290km/h)
Climb	
(Landplane)	900ft/min (274m/min)
(Seaplane)	830ft/min (253m/min)
Stall (w/flaps)	62 m.p.h. (100km/h)
Service ceiling	22,400ft (6,706m)



ABOVE The Sekani was the first Canadian-designed aircraft to be fitted with a retractable undercarriage, the heavily faired landing gear folding away rearwards. The undercarriage-retraction system was of the mechanical type and manually operated, usually by the second pilot. The tailwheel was fully castoring for ease of handling. Dual flight controls were fitted in the cockpit, the right-hand set being easily removable for extra passenger accommodation.

unsteady in lateral control and was sluggish fore and aft. It stated that taking off with a full load would be difficult, and even harder in rough conditions as the empennage hung very low on the water. Icing on the tail unit was deemed another undesirable possibility, as was float wash in rough conditions, which would drag on the already-vulnerable tailplane.

In flight the Sekani was reported by the RCAF officers to have a poor climb rate and an unacceptably noisy cockpit and cabin. The loading facilities for the aircraft were regarded as restricted and the cabin was deemed unsuitable for camera installations.

The end of the road?

With both civil and military operators rejecting the Sekani, on which the company had pinned its financial hopes, the future for Fairchild Aircraft Ltd looked bleak. Although the twin-engined Sekani seemed to be the next logical step in the development of a Canadian bush aircraft, its payload was no greater than the single-engined types it was intended to replace, but the cost was double. In the event, another Canadian company, Noorduyn, stepped into the breach with its superb single-engined Norseman, which had made its first flight in November 1934, and of which more than 900 would ultimately be built.

Happily for Fairchild, an RCAF requirement for a fast coastal reconnaissance/light bomber aircraft resulted in a production order for the twin-engined Bristol Blenheim IV, to be renamed

Bolingbroke in Canadian service. By the end of "Bolly" production, Fairchild had built a total of 626 examples in three main variants. It is often stated that it was this that saved the Canadian subsidiary of Fairchild from going bankrupt.

As for the two completed Sekanis, both were swiftly withdrawn from use and had been scrapped by the end of 1938, as had the components for a further three. Unsurprisingly, the Sekani does not enjoy prominence in the company's list of achievements, although in his excellent biography of Elsie MacGill, *Queen of the Hurricanes*, Dick Bourgeois-Doyle states that MacGill believed that Fairchild had given up too easily on the Sekani, and that, with time and more testing, the aircraft may well have proved effective. Perhaps. It is more likely, however, that it would have struggled against Noorduyn's much more economical Norseman.

As well as producing Bolingbrokes throughout the war, Fairchild also completed 300 licence-built Curtiss Helldivers (designated SBF-1, SBF-3 and SBF-4E) and components for hundreds of Vought F4U Corsairs and Grumman F7F Tigercats.

After the war, the company returned to the bush aircraft market as Fairchild Industries Ltd, designing and building the F-11 Husky single-engined high-wing monoplane. In a re-run of the Sekani episode, the aircraft could not find a market and the company went bust in 1948. Ultimately, bush aircraft had been the making — and the breaking — of Fairchild's Canadian subsidiary.



EAST MEETS WEST



Grabbing attention at its public unveiling at the 1967 Paris Air Salon — at 126ft long and with a base diameter of nearly 35ft, it could hardly do anything but — the Soviet Union's Vostok rocket was unquestionably the star of the show. **Dr DAVID BAKER** reveals why it caused such a stir, with Soviet Russia presenting hard evidence of its advances in spaceflight, a great deal of which was news to the West

ABOVE A lapel pin commemorating the Soviet Union's achievement in placing the first artificial satellite in orbit around the Earth, which it did with Sputnik 1 on October 4, 1957, using equipment which would be developed into the Vostok launcher.



IN THIS AGE of instant information, with images of dramatic events flashed around the globe within seconds, it is difficult to recall that 46 years ago it was quite easy for governments to keep secrets. So it was that, for more than four years after Yuri Gagarin became the first man to orbit the Earth in space, the world knew nothing about the spacecraft that took him there or the rocket that launched him on that world-changing flight on April 12, 1961.

Vostok itself, the spacecraft which had carried Gagarin into history, was revealed for the first time on April 29, 1965, at the All-Soviet Exhibition of Economic Achievements in Moscow — a propitious date, since the USA had just launched the first of ten two-man Gemini spacecraft with John Young and Virgil Grissom at the controls.

The mighty Vostok — meaning “East” in Russian — dwarfs its fellow exhibits at the 1967 Paris Air Salon at Le Bourget. The massive launcher was based on the R-7 intercontinental ballistic missile of 1957, also created by genius Soviet designer Sergei Korolev, who had died in January 1966.

Until it was unveiled in Moscow, nobody suspected that the Vostok re-entry module was a spherical ball and not a sleek projectile as many had surmised, inspiring one journalistic wag to dub it the “Baron Münchhausen cannonball!”

The Iron Curtain swings open in Paris

After flying modified versions under the Voskhod name in October 1964 and March 1965, Soviet Russia had already abandoned the Vostok design in favour of the Soyuz spacecraft, development of which had started as early as 1962. But not until 1967, more than ten years after it was first launched, would the rocket that put Sputnik 1 in orbit on October 4, 1957, and send all Russia’s manned space vehicles into space thereafter, be displayed publicly for the first time.



The Vostok's elegant design was quite different from that of any large rocket then being developed in the West. It comprised a single-core stage 28.75m (94ft 4in) in length and with a diameter of 2.95m (9ft 8in), with four tapered boosters, each 19.8m (32ft 2in) in length and 2.7m (10ft 8in) in diameter.



That event was the 27th *Salon International de l'Aéronautique et de l'Espace*, held in Paris in May–June 1967, when Le Bourget saw the arrival of the Soviet delegation complete with rail tracks, cradles, rocket stages and booster motors. For many years, speculation had fuelled debate about the design details of the rocket dubbed SS-6 *Sapwood* in NATO nomenclature. Developed as the Soviet Union's first Intercontinental Ballistic Missile (ICBM), it came as a surprise to Western intelligence officials who had very little to go on when drawing assumptions about the rocket's true configuration.

In reality, the rocket, known to the Russians as the 8K72K and derived from the R-7 ICBM, was deceptively simple. A single-core stage, it had four thrust chambers fed by a single turbopump driving kerosene and liquid oxygen propellants and four small vernier motors. Strapped to the core stage were four tapered boosters, each fitted with similar four-chamber engines and two smaller vernier motors. Attached to the top of the core, a single upper stage distinguished the Vostok launcher from the R-7 ICBM and provided the power to place the 4.7-tonne (4.6 ton) spacecraft in orbit.

Classic Soviet design

To observers of the Vostok launcher watching it being assembled at Le Bourget, the rugged nature of its design became evident. With a single lifting point at each end of the core and boosters, hoists assembled it in the horizontal position and the cradle to which it was attached was raised to an impressive inclination. This was the way it was put together for a real launch, rolled out to the pad on

a flatbed truck and raised to a vertical position. It was simplicity itself: no hold-down clamps to check the performance of the rocket motors before flight; it simply lifted off when thrust exceeded mass.

Once off the ground, the four boosters would separate just short of 2min into the flight, the core stage shutting down 3min later, leaving the upper stage to burn for 6min to place the Vostok spacecraft in orbit. Compared with the USA's Atlas, which placed the one-man Mercury spacecraft in orbit with a lift-off thrust of 1,600 kN (360,000lb-thrust), the 4,795kN (1,000,000lb-thrust) Vostok was a giant. And even compared to the Titan — which placed ten manned Gemini missions in orbit in 1965 and 1966 — it was impressive. Yet, by the time it was publicly unveiled, it had already been eclipsed by much more powerful rockets and the Americans had moved on to equal those as well.

What applied to the space programme in those chilly days of the Cold War was also true of the aviation industry, very little information leaking out into the West about the latest and best of Soviet technology. But while the giant Saturn rockets that would send Americans to the Moon just two years after the Vostok rocket was first seen in public, and the Shuttles that flew 135 missions between 1981 and 2011, are now history, the rocket that launched Sputnik 1 and the Vostok manned spacecraft lives on. The Soyuz rocket that was developed from the R-7 ICBM is today the only way astronauts can reach the 400-tonne International Space Station. If simplicity is less, then less is more as Russia continues to fly a rocket that stunned visitors to the Paris Air Show 46 years ago.





ABOVE Dispensing with the somewhat more delicate approach employed on Western space hardware, Vostok's cradle was itself a classic of robust Soviet design, the Paris example being mounted on a rail transporter wagon. The peak acceleration experienced by the cosmonaut would have been about 5g, just before booster separation.



ABOVE Fully assembled, the rocket and its payload were 38.4m (126ft) long and the four boosters provided a base diameter of 10.3m (33ft 9½in), including the delta-fin stabilisers. It weighed almost 245 tonnes (241 tons) at lift-off. Note the smaller vernier motors, providing 10,000lb-thrust each, a fifth of that of each main thrust chamber.

ILL WIND



April 1959: somewhere on Turkey's snow-capped border with the Soviet Union an ageing British airliner has vanished. To make matters worse it is carrying top-secret components for Britain's nuclear weapons programme over an area in which the Soviets are notorious for misdirecting aircraft — is it pilot error or espionage? ROGER CARVELL investigates . . .



MOUNT SÜPHAN, a long-dormant volcano, lies to the north of Lake Van in eastern Turkey. At 14,547ft (4,434m), Mt Süphan is Turkey's second-highest mountain and in summer, when the snows have melted away, it is a popular destination for experienced climbers who can make the ascent in a day. The guide-books make no mention, however, that this is the final resting place for 12 British airmen killed on April 23, 1959, when Avro Tudor "Super Trader" G-AGRH, named *Zephyr*, crashed into the mountain's eastern summit. The aircraft belonged to British airline Air Charter Ltd and was on a routine Ministry of Supply cargo flight from Stansted to Adelaide in South Australia.

The loss of G-AGRH prompted a huge six-day search by RAF, Turkish and Iranian aircraft. While RAF Handley Page Hastings and Avro

The first of the Avro Tudor 4Bs modified to "Super Trader" standard by Freddie Laker's Aviation Traders Ltd for his airline Air Charter, G-AHNI Trade Wind is seen here at Negombo in Ceylon (now Sri Lanka) in June 1955.

PHILIP JARRETT COLLECTION



Shackletons combed a large area of eastern Turkey, the disappearance of the Tudor was discussed in cabinet at Downing Street. Of great concern to the Macmillan Government was the missing airliner's cargo — the latest top-secret British missile components en route to Australia's Woomera rocket range for assembly and test-firing. The airway corridor *Romeo Hotel* would have flown lay only 80 miles from the Soviet Union's Armenian border; a wild, inhospitable area of some notoriety.

Soviet misdirection

The previous year a USAF C-130A Lockheed Hercules on an electronic eavesdropping mission had been lured over the border into the Soviet Union to be shot down by MiG-17s. Such acts of aggression were part of the Soviets' testing of the USA's nerve; the Turkish/Soviet border,

where the East and West superpowers brushed and abraded against each other, was an ideal Cold War testing ground of political resolve.

On April 29 the *New York Times* reported that aircraft wreckage had been found within hours of the air search being called off, by an RAF Hastings, near the summit of Mt Süphan. With Turkey's permission the RAF had based a number of Hastings and Shackletons at Diyarbakir. Unhampered by British reporting restrictions, the *New York Times* had earlier claimed that the missing Tudor was "carrying secret nuclear equipment" while the *Daily Telegraph* reported that *Romeo Hotel* was "carrying important secret equipment". These news stories would have been carefully monitored in Moscow, especially as the crashed Tudor with its secret cargo of unassembled missiles lay close to the Soviet border.



PHILIP JARRETT COLLECTION

ABOVE Avro Tudor Freighter 1 G-AGRH (c/n 1256) with its original short nose, as used by British South American Airways before being converted by ATL into a long-nose Super Trader for Air Charter service in 1956. Despite its good range, the taildragger Tudor was vastly outclassed by more modern American airliners like the Douglas DC-6.

With great urgency Downing Street instructed the RAF to destroy the missiles, while also trying to establish why the Tudor — flown by a highly experienced crew — was, inexplicably, nearly 35 miles north of its intended track.

The Super Trader

As Britain's first post-war pressurised airliner, the Tudor had a troubled development which led to its rejection as "unsuitable" by the British Overseas Airways Corporation (BOAC). Unfinished airframes were scrapped on the production line at Avro's Woodford factory and the airliner began to acquire an unlucky reputation, magnified by the crash of the lengthened Mk 2 prototype G-AGSU, which killed four crew including its designer Roy Chadwick and Bill Thorn, Avro's chief test pilot. Three more tragic losses, in mysterious circumstances, followed before the Tudor redeemed itself during the Berlin Air Lift as a capable freighter.

F.A. "Freddie" Laker formed Air Charter Ltd at Southend in 1947 and in the early 1950s won contracts to fly cargo into West Berlin using Avro Yorks, aided by Tudor G-AGRY. Impressed by its capabilities, Laker then bought no fewer than 17 Tudors, a mixture of Mk 1s and Mk 4s, the latter distinguished by a 6ft (1.8m) extension in the front fuselage. By scrapping some, Laker produced a large spares holding. Aviation Traders, also owned by Laker, specialised in aircraft modification and on March 2, 1955, the prototype Tudor 4B "Super Trader" conversion, G-AHNI *Trade Wind*, made its maiden flight under the command of Capt John

Bridger. The Super Trader featured new twin freight doors in the rear fuselage, giving a useful 6ft 10in-wide x 5ft 5in-high (2.1m x 1.65m) aperture for the loading of bulky items. The electrical, heating and ventilation systems received major mods, and the unpressurised Tudor was fitted with a Shackleton undercarriage and modified propellers, driven by four Rolls-Royce Merlin 623 engines.

Air Charter had originally planned for two pure freighters and two convertibles for passenger or freight operations, but by 1955 six Super Trader conversions had been completed and the company had been awarded a lucrative Ministry of Supply contract to fly regular cargo services to the Atomic Weapons Research Establishment (AWRE) at Woomera in southern Australia. Each Super Trader was expected to take 14 days to complete the 24,000-mile (38,600km) round trip.

Laker's financial gamble and technical faith in the revitalised Tudor had paid off and on March 30, 1955, G-AHNI lifted off from Stansted bound for Woomera. It became a reliable performer despite occasional incidents on the route; for example 'NI swung on take-off at Malta during one of the Australia flights. Nevertheless the type established a reputation among pilots as difficult to handle on the ground, particularly in crosswinds, and as being tiring to fly over long distances.

By 1959 the Super Trader's operational luck began to run out. On January 27 G-AGRG, named *El Alamein*, veered off the runway at Brindisi in southern Italy. The aircraft burst into flames and two of the crew lost their lives.

AVRO TUDOR 4B "SUPER TRADER" DATA

Powerplant 4 x 1,760 h.p. Rolls-Royce Merlin 623 piston engines

Dimensions

Span	120ft 0in	(36.6m)
Length	85ft 3in	(26m)
Height	20ft 11in	(6.4m)
Wing area	1,421ft ²	(132m ²)

Weights

Empty	45,375lb	(20,582kg)
Loaded	83,600lb	(37,920kg)

Performance

Maximum speed	282 m.p.h.	(454km/h)
Cruise speed	210 m.p.h.	(338km/h)
Initial climb	635ft/min	(194m/min)
Ceiling	23,500ft	(7,163m)
Range	1,300 miles	(2,092km)

The last flight of Zephyr

On April 21, 1959, Air Charter had prepared all the paperwork and gained airways clearance for the company's next Super Trader flight from Stansted to Woomera. Out on the ramp G-AGRH *Zephyr* had undergone an engine change and made a 30min air test the previous evening. The aircraft was to be commanded by Capt John Bridger, a highly experienced Tudor pilot who had been awarded the Distinguished Flying Cross for his clandestine Lysander flights into wartime France.

The Super Trader's compass was swung before 'RH' was loaded with secret missile parts packed in crates. In addition to the missiles, the crew of six was to be accompanied by a further six Air Charter crew who were to be slipped at Bahrain, to fly G-ANCE, the company's new Bristol Britannia.

The Super Trader left Stansted at 0856hr GMT on April 22 and flew in clear weather conditions to Brindisi. Approximately one hour out from Stansted, G-AGRH passed G-AHNL, commanded by Capt Quantick, inbound on the last stage of his long flight from Woomera to Stansted. On landing at Brindisi, Bridger met Capt Scott of G-AHNL, also en route to Stansted. Both crews night-stopped at the same Brindisi hotel; Scott found the 12 outbound crew to be in good spirits.

Early the next morning Bridger took off on the second sector across Greece towards Turkey. Air Charter aircraft normally called at Istanbul for refuelling but Bridger, who had some latitude in conducting his flight, flew on to Ankara. He was well aware of anti-British feeling in Iraq following the recent revolution that had deposed the Iraqi monarchy. The UK's Ministry of Aviation had strongly advised Air Charter that, owing to *Romeo Hotel's* secret cargo, it would be prudent to avoid Iraq altogether. By taking on fuel at Ankara, Bridger could shorten the third sector to Bahrain by flying an alternative, approved company route, via Van in eastern Turkey to western Iran, thus circumventing the threat of detention in Iraq.

From Ankara, *Romeo Hotel* took off at 0719hr on the projected 6¼hr flight to Bahrain, with fuel reserves for a further 3hr at its maximum weight. The meteorologists at Ankara had forecast considerable cloud from 2,000ft up to 16,000ft and strong south-southwesterly winds of up to 30kt (55km/h), but the crew experienced gusts reaching some 50kt (90km/h). The minimum (but not mandatory) safe altitude on this airway into western Iran was 17,500ft, but Capt Bridger was aware that Mt Süphan lay well north of the airway. He was also aware of the unreliability of HF radio and the navigation beacons east of Ankara.

At 0800hr the Super Trader sent Ankara a routine position report while over Gemerek in central Turkey. Bridger then changed to VHF and at 0830hr informed the controllers at Elazığ Airport that he was at 11,500ft. *Romeo Hotel* was

Crunch! Super Trader G-AHNL at rest after having swung off the runway at Malta during one of its Woomera flights. The aircraft was ultimately scrapped at Stansted in the summer of 1959.

PHILIP JARRETT COLLECTION





AUTHOR'S COLLECTION

ABOVE Another of Air Charter's Super Traders, G-AHNO, named *Conqueror*, at Southend. Like the careers of all Air Charter Super Traders, that of G-AHNO was short; it entered service in 1956 and was scrapped at Stansted in 1959.

BELOW Members of the RAF Nicosia Mountain Rescue Team in Cyprus at the time of the loss of G-AGRH. Back row, left to right: leader Robertson, Bishop, Murphy and Ellis (doctor). Front row, left to right: Costall and Emmerson.

now in 7/8ths cloud, Bridger flying on instruments while navigation officer Hill accurately plotted the Super Trader's course using a BOAC chart.

The airliner was now being buffeted by much stronger than forecast SSW winds.

At 0840hr Bridger called Elazığ again and reported that he was "overhead Muş" at 13,500ft and that he was a few minutes behind schedule. Bridger expected to be over Van at 0852hr. Nothing more was heard from Capt Bridger or his crew.

Race to the crash site

Ten days later, on May 2, Flt Lt Richard Robertson, leader of the 17-strong RAF Nicosia Mountain Rescue Team reached Mt Süphan's 14,547ft western summit after being airlifted up the mountain by a Turkish Air Force Sikorsky S-55 helicopter, overtaking four other RAF members who had earlier set off on foot, and in worsening weather had established Camp 1 in deep snow at 11,000ft.

Robertson could see that Süphan's eastern summit lay two miles distant (where the Super Trader lay) and that reaching it meant descending 1,000ft and crossing a windswept plateau to establish, at the base of the eastern peak, Camp 2 for the night, joining up with the foot party. The RAF team had earlier seen a Hastings of No 70 Sqn fly over the crash site and make an accurate drop of

panniers containing tents and firearms — the latter to counter any threat from bears or wolves. The weather deteriorated, preventing location of

the panniers, and two of the team descended to Camp 1 to bring up food supplies as Robertson's party had none. That night sickness struck and in the early light of May 3 Robertson decided to have six more members airlifted up from base camp.

Although they were expert mountaineers, Robertson's men had no experience of crash investigation. They had been carefully briefed, however, on what to look for. Owing to the failure of an

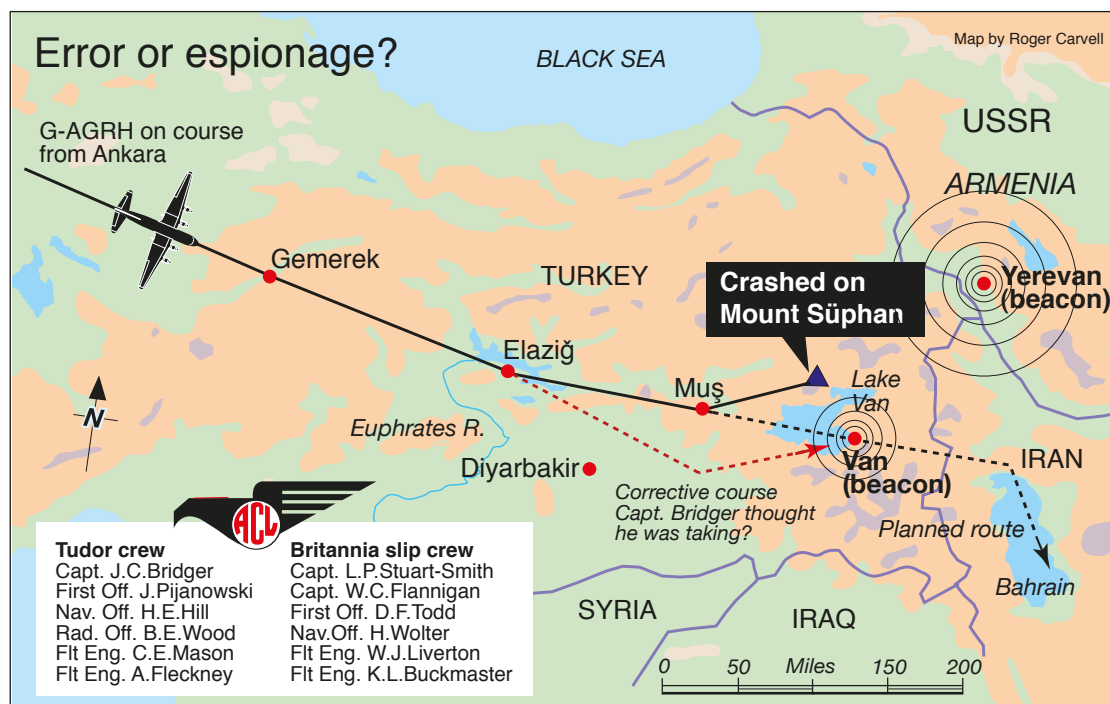
explosives specialist to reach the crash site, it fell to the mountaineers to destroy the secret cargo themselves. A second Hastings appeared overhead, this time parachuting down explosives and fuzes.

With Camp 3 established at the Tudor's final resting place, work began.

What happened?

Romeo Hotel had hit one of the many hillocks that surround Mt Süphan's eastern peak, disintegrating into large sections, and then, in a fireball, somersaulting into the summit's bowl, projecting wreckage and bodies forwards for a considerable distance. All 12 members of the crew had been killed instantly and torso examination





revealed that nobody had been strapped in.

Bent, but unfeathered, the propellers revealed that all four Merlins had been producing full power on impact. To the searchers a picture developed of the aircraft's occupants working or relaxing in normal flight; the image was heightened by the poignant discovery of a well-thumbed novel lying in the snow.

The mountaineers found the aircraft's tail unit, perpendicular and unburnt, still proudly displaying the Union Flag. A strong smell of recent fire pervaded the site, despite much of the dispersed wreckage being obscured by fresh, deep snow. One by one the crash victims were brought together and gently laid in a shallow dip, to be covered with rocks, as it was impossible to dig. A short prayer was intoned.

To their dismay the members of the RAF team found that they were not the first to arrive at the Super Trader's last resting place. In the intervening days, Kurdish tribesmen had looted the wreck, removing personal effects such as watches as well as the cockpit clocks, invaluable items for clues as to why the aircraft was so far off course. By taking two independent hand-held compass readings along the centre line of the crash, the RAF mountaineers read off bearings of almost 070°. Luckily the smashed instrument panels retained two compasses, one a repeater, frozen at exactly 070°.

A large amount of classified paperwork accompanying the missiles had been widely dispersed by the fireball and this had to be laboriously collected up by the men as they stepped through

"A picture grew of the aircraft's occupants relaxing in normal flight, heightened by the poignant discovery of a well-thumbed novel lying in the snow..."

the deep snow. Meanwhile, the missile cargo was destroyed, the team first reading the printed instructions on how to deploy explosives and fuzes; to Robertson's great annoyance his camera, to record the operation, was inadvertently left on a fuze and blown up!

Once the missile cargo had been successfully destroyed, Robertson's weary mountaineers remained on Mt Süphan's eastern summit until the following morning when they began their descent, the faithful TAF S-55 recovering the men when they reached the 10,000ft level. They



arrived back in Cyprus by Hastings the following night to face the awaiting television and press. In their wake, the Turkish military eventually recovered the crew's personal items and 3½ tonnes of the Super Trader's wreckage. None of this was returned to the UK.

For their part in destroying the secret missiles and having the unenviable task of burying the dead, Flt Lt Richard Robertson, officer in charge, was awarded the MBE. Flt Sgt Harry Appleby, Sgt Jack Emmerson and Senior Aircraftman (SAC) George Murphy were given the British Empire Medal and SAC Gordon Hercod was presented with The Queen's Commendation for Bravery.

Strong protest

The Turkish Commission of Enquiry investigated the loss of G-AGRH and published its findings on October 21, 1959. It drew a strong letter of protest from Capt E.N. Jennings, Chief Pilot at Air Charter. The Turkish investigation panel, none of whose members had visited the crash site, blamed Capt Bridger and his crew for poor airmanship and navigation.

Capt Jennings had participated in the enquiry and was angry that such a degree of blame could be pinned on Capt Bridger, a highly experienced Tudor pilot with some 13,000hr in his logbook. Jennings's own investigations at Ankara's Esenboğa Airport had found that the duty meteorological officers claimed that Bridger had never visited their office for the day's forecast.

They had lied to distance themselves from the accident and were forced to retract the allegation. Bridger and his crew did visit, coming away with a route forecast given also to an Airwork Handley Page Hermes crew. That there was crew navigation error cannot be entirely ruled out but, as Jennings forcefully explained, G-AGRH carried not only Bridger, who had written much of the latest Air Charter Operations Manual, but also the Chief Navigator and Chief Training Pilot. If there had been a crisis on board, their expertise would have been called upon.

It was true that very strong flank gusts had pushed *Romeo Hotel* further north, but this was nothing that could not be dealt with safely and effectively by an experienced crew. The RAF mountain rescue team had found no evidence of a flightdeck crisis. If Bridger had felt unsure of his position in cloud, he would have immediately climbed to 15,500ft, the established safety height over eastern Turkey. There was no question of the Super Trader's ability to climb with a full load. It appeared that the crew members were not where they thought they were. Questions remained: why had the aircraft steered a course of 070° instead of the normal 090° towards Van? Did Bridger think he was too far south and thus altered his heading to 070° to bring him overhead Van, the next reporting point?

Captain Jennings knew that the Turkish enquiry would carefully omit to mention, for political reasons, a more sinister solution as to the Tudor's fateful deviation.



AUTHOR'S COLLECTION



VIA GRAHAM FOLWELL X 2

ABOVE LEFT *The doomed Romeo Hotel at a palm-fringed airport during one of its previous cargo flights. Note the large rectangular freight doors in the port side of the fuselage. Following their conversion to Super Traders, the Air Charter fleet made a number of outstanding long-distance charter flights, notably to Christmas Island in the Pacific and New Zealand, hence their suitability for the freighting of weapon components to Australia.*

ABOVE RIGHT & RIGHT *Photographs taken on Mount Süphan in 2007 show that parts of the wreckage of the Super Trader may still be seen at the crash site. Much of it was recovered by Turkish forces, but none was returned to the UK.*



Foul play?

"Meaconing" was a practice regularly undertaken by the Soviets, switching on a very powerful beacon at Yerevan in Armenia, whose identical but false transmissions could "blank out" the smaller beacon at Van. This Soviet lure had brought down the USAF's Hercules intelligence-gatherer in 1958. This time the Soviets would have a keen interest in *Romeo Hotel's* secret cargo. Thick cloud that day proved ideal for meaconing, conveniently obscuring noticeable ground features such as Lake Van. Meaconing was well known among Turkish and American airmen, but perhaps less so to civil pilots.

In order to preserve the political status quo neither the American, Turkish or British authorities acknowledged the practice in public. It was simpler to state that "the Van beacon is sometimes unreliable". The Soviets, in turn, claimed

they had no record of a British aircraft near their border on March 23, 1959.

To this day the mystery of G-AGRH's strange detour remains unresolved and the UK government has never absolved Capt Bridger and his crew of any blame. The cargo is still classified as secret and there are few documents in the public domain. By April 1960, when Jennings wrote his final conclusions on the loss of G-AGRH, the four surviving Super Traders were already engineless on the dump at either Southend or Stansted, unloved and little mourned.



ACKNOWLEDGMENTS *The author would like to thank Graham Folwell (whose father died in the crash), Gordon Hercod and Tony Merton Jones of Propliner Aviation Magazine for their invaluable help with the preparation of this article*

BUENOS AIRES & BUST!



*One of the fastest and most agile British fighters of the First World War, the Royal Aircraft Factory S.E.5a was obsolete by the early 1920s; nevertheless a number continued to serve in various roles around the world. **RICARDO M. LEZON** traces the short career of the sole example sent to Argentina in 1926*

IN ALL, SOME 5,270 Royal Aircraft Factory S.E.5s and S.E.5as were built (including one by Curtiss in the USA), and while the RAF declared the type obsolete in September 1921, a number went on to serve in military and civilian roles around the world, including a single example in Argentina.

In 1926, Señor Jorge A. Luro, the representative in Buenos Aires for Chance Vought, Sikorsky, Stearman, Northrop, Pratt & Whitney and Boeing, presented the Argentinian naval arm, *Aviación Naval*, with an unidentified S.E.5a he had purchased from RAF surplus stocks. It was powered by a 200 h.p. Wolseley Viper water-cooled V8 engine, serial number 4349R F74862.

On September 27, 1926, the S.E.5a was despatched by train from San Fernando railway station in Buenos Aires to *Estación Aeronaval* Puerto Belgrano at Bahía Blanca where it was overhauled at *Talleres de Aviación* de Campo Sarmiento. Since the ageing biplane was not suitable for front-line



service, it was decided to employ it as an advanced trainer within the naval aviation school, *Escuela de Aviación Naval*. The aircraft was coded “E-11”, later becoming “AC-21” (AC standing for *Avión de Caza*, or fighter aircraft).

The aircraft’s flying career came to an end on January 24, 1929. Pilot Alférez de Fragata Alberto Sautu Riestra executed too flat an approach

to Campo Sarmiento and made a premature arrival within the airfield perimeter. The starboard wheel broke after touchdown, leading to the collapse of the undercarriage and a smashed propeller. The aircraft came to a stop after sliding on its lower fuselage. Happily, the pilot stepped out unharmed.

The aircraft was taken back to the hangar for inspection but unfortunately the *Aviación Naval* lacked any plans or spares. Technicians considered modifying the airframe to employ locally-built parts but Argentina’s sole S.E.5a was quite clearly obsolete and was – unsurprisingly – deemed beyond economical repair.



TOP *An unknown pilot, probably Argentinian, stands beside the S.E.5a as it has its engine run up while in service with the *Aviación Naval*, the Argentinian naval arm, in the late 1920s.*

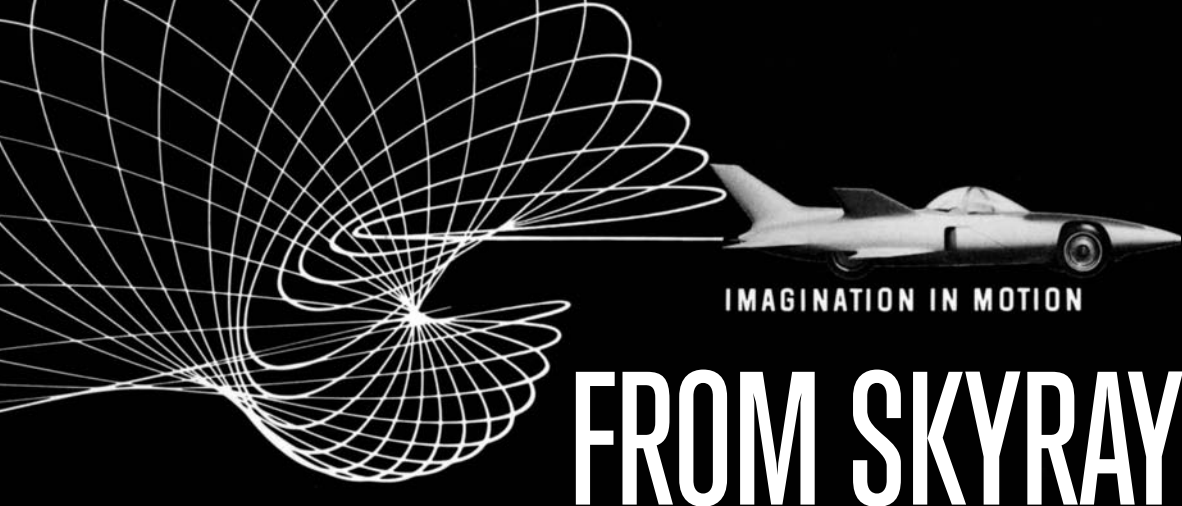
INSET ABOVE *The Argentinian naval jack, incorporating the Sun of May emblem, a national symbol in both Argentina and Uruguay.*

RIGHT *Another view of S.E.5a AC-21 having come to grief during its last flight in January 1929. It never flew again.*



The sole Argentinian Navy S.E.5a, AC-21, following its rough landing at Campo Sarmiento on January 24, 1929. Note the Sun of May symbol on the rudder. The author would like to thank Argentina's Archivo Naval General and Robert M. Stitt for their help with the preparation of this feature.





FROM SKYRAY TO FIREBIRD

*Having introduced tailfins on the 1948 Cadillac after being inspired by Lockheed's twin-boomed P-38 Lightning fighter, General Motors' Vice President of Design Harley J. Earl had an epiphany on board an airliner in the early 1950s when shown a picture of the US Navy's futuristic Douglas F4D Skyray jet fighter — henceforth the car of the future would follow aeronautical principles. **NICK STROUD** examines Harley Earl's "Highway Skyrays"*

IN A FASCINATING interview on aviation/culture blog *Hush-Kit* (<http://hushkit.wordpress.com>) in May 2012, McLaren F1 supercar designer Peter Stevens theorised on the often close relationship between aircraft and automobile design:

"In aircraft terms all cars can be described as being reliant on 'low speed aerodynamics', but the actual shapes are often taken from very high speed aircraft". One of the most blatant examples of this idea at work was American car designer Harley Earl's astonishing Firebird series of concept cars for General Motors (GM) during the 1950s. Powered by gas-turbine engines developed by Emmett Conklin and bristling with fins, bubble canopies and other aeronautically-inspired refinements, the Firebirds represented the high-point of America's obsession with the jet age.

TWINBOOMS AND FISHTAILS

Earl was no stranger to using aircraft as inspiration — his Le Sabre concept car of 1951 was, as the name suggests, directly influenced by North American's F-86 Sabre jet fighter, then fighting it out with Soviet MiGs over Korea. He had also

long admired the unorthodox twin-boom layout of Lockheed's World War Two-vintage P-38 Lightning, reflected in the designer's fishtail fenders for later GM products. Earl was fascinated by the impression of speed that aircraft imparted, fighter aircraft in particular adhering to his concept of cars looking long and low, alert, ready to pounce.

Having introduced sharply-swept fins and wraparound windshields, both a prevalent part of contemporary fighter design, on the Le Sabre, Earl felt compelled to push further into the realms of the fantastic, often making almost impossible demands on his long-suffering technical team, led by engineer Robert F. McLean, in the interests of pushing the envelope of American automobile design.

Reportedly, Earl was aboard an airliner during one of his frequent trips across the USA in the early 1950s when he read a short article in an in-flight magazine on the futuristic Douglas F4D Skyray, which made its first flight in January 1951. Earl was fascinated by the US Navy's new fighter and stared at the photographs in the article for more than an hour. Remarking that it was "a striking ship", he tore the page from the

Is it a car? Is it a fighter jet? Designer Harley Earl's Firebird I of 1953 for General Motors took ideas from both to make one of the most unusual automobiles ever built. Here Indy 500 legend and GM test driver Mauri Rose prepares the Firebird I for a "test flight".





ABOVE The concept of GM car designers Harley Earl and Robert McLean to develop an automobile that “looked like a fighter on four wheels” was inspired by aircraft designer Edward H. Heinemann’s Douglas F4D Skyray, which made its first flight in January 1951. The planform of the resulting Firebird I echoed the Skyray’s modified delta wing.

magazine and put it in his inside pocket before settling into deep thought. When his travelling companion asked whether he was thinking of next year’s model and what it might be, Earl paused for a moment before slapping his breast pocket and saying “I have it right here”. Earl later recalled: “I was only answering the banter in kind. Then bingo, I decided I had kidded myself into something”.

THE FIRST FIREBIRD

Design and construction of the first Firebird began in 1953, the idea being to create a complete rolling laboratory in which state-of-the-art technology could be tested in real road conditions. It was also a clear opportunity for GM to showcase the extremes in technology and design that it was capable of. Given the company designation XP-21, the single-seat Firebird I was the first American car to be powered by a gas turbine engine, in the form of the 400 s.h.p. GT-302 Whirlfire. Arguably the single most impractical car ever devised, the Firebird I comprised a bullet-shaped glass-fibre fuselage with a single fin and short rounded delta “wings” (as on the Skyray), the driver being accommodated in a fighter-style cockpit with a bubble canopy. Split trailing-edge flaps were also incorporated to supplement the Firebird’s wheel brakes — another lift from aeronautical design.

In October 1953 the car was tested by GM’s Research Manager, Charles L. McCuen, who was

seriously injured when the Firebird went out of control and left the banked track on which it was being tested. Indy 500 racing driver Mauri Rose took over the test driving programme, and, despite issues with noise, exhaust overheating and — unsurprisingly — extremely high fuel consumption, Rose deemed the bizarre machine to be technically satisfactory.

Earl’s second Firebird, designated XP-43, was intended to parlay the lessons learned with the Firebird I into a more practical four-seat family car. With its distinctive double air intakes at the front, high bubble canopy and fin, the Firebird II was intended to be a component of GM’s “Safety Autoway of Tomorrow”, a rapid-transit system which would take advantage of an “electronic brain” in the car, which received signals from a metallic conductor buried in the road, the magnetic device creating a form of autopilot for cars. The boffins at GM



worked hard to get the system working and eventually conducted successful tests of what the company dubbed the “dream highway”.

The Firebird II was the first car to have its entire exterior bodywork constructed from titanium, then being used in the construction of the USA’s state-of-the-art fighters such as the McDonnell F-101 Voodoo and Lockheed’s F-104 Starfighter — another of Earl’s appropriations of contemporary aeronautical techniques.



Three generations of Firebird in a classic 1950s promotional shot. From left to right: the purely experimental Firebird I of 1953, which led to the development of the four-seat — but barely more practical — Firebird II of 1956. The final incarnation of the marque was the 1958 Firebird III, fitted with canopies reminiscent of one of Harley Earl's favourite aircraft, the Lockheed P-38 Lightning.

The very essence of what Harley Earl described in a fighter's appearance as "long and low — alert — ready to pounce" was typified by the sleek supersonic Republic F-105 Thunderchief fighter-bomber.



FIREBIRD III — THE EPITOME OF CAR COOL

If the Firebird II reflected fighter aircraft design in the mid-1950s, the last — and most extravagant — of the Firebirds anticipated the cutting edge of the next generation of American warplanes, typified by Republic's super-sleek F-105 Thunderchief, which entered US Air Force service in mid-1958. While GM's engineers were perfecting the "electronic chauffeur", Earl and his team were going for broke with a design that incorporated no fewer than seven wings and fins protruding from a science-fictionesque wedge-shaped main body. Pro-

motional material of the time dispensed with any pretence of subtlety and announced that the new Firebird would be "an entirely different kind of car, in which a person may drive to the launching site of a rocket to the moon", the aeronautical terminology being supercharged to include the rapidly-escalating space race.

The new car, which incorporated twin bubble canopies, cruise control and air-conditioning, was to be fitted with an extension of the Firebird II's "ping-pong ball" control system, "Unicontrol", in which steering, acceleration and braking would be



ABOVE Harley J. Earl beside the sole Firebird II, which incorporated large air intakes at the front, a bubble canopy and a vertical fin at the rear. As well as having its bodywork made from titanium, as used on contemporary aircraft, the fuel used for the Firebird II's gas turbine engine was kerosene; it not only looked like a jet, it smelt like one too.

performed by means of a single control stick, again echoing contemporary fighter cockpit design.

The initial tests of all three Firebirds were referred to as “first flights”, that of the Firebird III taking place at GM’s Desert Proving Ground in Phoenix, Arizona, in August 1958, the machine subsequently undergoing extensive trials in a windtunnel — as used for testing aircraft.


Publicly unveiled at GM’s 1959 Motorama show in New York City and Boston (actually held in October 1958), the Firebird III was a hit; the two-seat rocket-ship of the road fired the imaginations of the young and old alike. As on the Firebird II, Earl had sought to exploit aerodynamic braking in the form of air brakes, which emerged from flat panels in the Firebird III’s main body. The Whirlfire GT-305 engine provided propulsion power only, a separate two-cylinder powerplant being installed to drive the electrical and hydraulic accessories.

The Firebird III was not just a hit at the car shows; in April 1959 it was exhibited at the World

Congress of Flight in Las Vegas, its space-age looks fitting right in with the highly advanced military hardware on view at nearby Nellis AFB.

NEXT STOP – GROUND-EFFECT?

The Firebirds were never seriously intended for production, however earnest the brochures were in suggesting otherwise. Although a mock-up Firebird IV ground-effect car was built, GM decided that the III was the end of the line for the ambitious space-age Firebirds. The name, however, lived on in a series of Pontiac “ponycars” from 1967.

All three Firebirds survive and have been acquired by GM, which aims to restore them to roadworthiness and maybe tour them. Happily, car designers are still taking cues from aeronautical developments, as Peter Stevens explained in his *Hush-Kit* interview: “I do think that designers are looking at things like the F-117 stealth fighter for inspiration; the Lamborghini Aventador is a good example of this trend”. Long may it continue. 



ABOVE The Firebird III made its public debut at the 1959 Motorama show held at the Waldorf Astoria hotel in New York City during October 16–22, 1958. Again incorporating elements of aeronautical design, the Firebird III’s steering was directed by a control stick positioned between the seats — unsurprisingly the idea didn’t catch on.



By February 1945 Hermann Goering was desperately in need of good news to take to the Führer. A bold attack on the Royal Navy's vital base at Scapa Flow using "piggyback" Mistel bombers would provide it. Using first-hand accounts from both sides **ROBERT FORSYTH** relates how RAF Mosquitoes put a stop to it and discovers an intriguing post-war confession

A LONGSIDE ITS ARSENAL of technologically advanced jet fighters and bombers, in late 1944 the Luftwaffe could call upon an altogether more unconventional yet equally ingenious weapon. The Mistel (mistletoe) composite bomber (also known by the Germans as *Vater und Sohn* — "Father and Son" — and by the Allies as a "piggyback" or "pick-a-back" aircraft) had been designed and developed in 1943 by engineers at Junkers as a weapon to be used against heavily armed, armoured or strengthened targets, such as aircraft carriers, battleships, large fortifications and bridges.

The design involved the "sitting" of either a Messerschmitt Bf 109 or Focke-Wulf Fw 190 fighter on top of a Junkers Ju 88 airframe that had been fitted with a large hollow-charge warhead nose carrying a 3.5-tonne payload of high-explosive. The concept was for the pilot of the fighter upper component to fly both aircraft to the target, whereupon the lower component would be released, hopefully on course to achieve a direct hit.

The all-up weight of an operational Mistel combination fitted with a warhead was about 44,100lb (20,000kg), some 15,430lb (7,000kg) heavier than a normally-loaded Ju 88 and thus approaching the load limits. This placed heavy demands on the undercarriage, which needed to

MAIN PICTURE Mistel at a Luftwaffe base that has fallen into Allied hands in 1945. Had it been used earlier and in greater numbers, the Mistel "piggyback" combination may have proved to be a decisively destructive — if somewhat blunt — piece of military hardware.

INSET RIGHT Feldwebel Rudi Riedl, one of the 6./KG 200 Mistel pilots tasked with participating in Unternehmen Drachenhöhle — Operation Dragon's Lair — in February 1945.



INTO THE DRAGON'S LAIR



"The Mistel became so important that even Goering wanted to use it. On February 14, 1945, as we were about to climb aboard our aircraft for our ride to hell, we heard the sounds of aircraft engines and machine-guns firing. Incredulity followed shock. Was it a coincidence? Had someone revealed our plans?"

Feldwebel Rudi Riedl, Mistel pilot of 6./KG 200





THE MISTEL'S CONTROL SYSTEM

THE MISTEL COMPOSITE was constructed in such a way that the Bf 109/Fw 190 rested on two three-legged supports, fastened with spherically-aligned bolts. These supports were attached to points on the front and rear spar joints as well as to frame 9 of the Ju 88's fuselage. The third attachment was made in front of the tailwheel well of the fighter via a collapsible strut, attached to frame 20 of the Ju 88's fuselage, which enabled the fighter's incidence to be increased during separation. The fighter was fastened to the supports by means of explosive bolts. On separation, only the bolt keeping the collapsible strut straight was detonated by the pilot. The subsequent increase in the angle of incidence of the fighter operated a switch to command the detonation of all three bolts holding the aircraft.

The Ju 88's engines were throttled mechanically from the fighter via a linkage system, which during the release sequence was also explosively separated. The throttle levers fitted to the fighter were much longer than those normally found in the Ju 88 in order to overcome the higher friction forces associated with the modified throttle system. Two dual-function instruments, indicating engine manifold pressure and engine speed (r.p.m.), were fitted to the fighter to monitor the performance of the Ju 88 engines. The electrical connections between the two aircraft were made with two multi-pin shear connectors. Their halves were secured by locking wire to prevent inadvertent separation.

A directional control system enabled the Mistel combination to fly solely under control from the fighter. The system could be operated in two conditions: "automatic" and "cruise". In cruising flight, control movements were measured by a potentiometer and transmitted electrically to the servos coupled to the flying control surfaces of the Ju 88. In the "automatic" flight condition the Ju 88 could be controlled by switches fitted to the fighter's control column and instrument panel. The switches were arranged to send directional and lateral control commands to the Ju 88 in the same way as if the pilot were physically controlling the aircraft.

ABOVE Both a brilliant piece of technical ingenuity and a symbol of the Luftwaffe's increasing desperation as the tide of war turned against Germany, the Mistel concept was initially tried with a Messerschmitt Bf 109 atop a DFS 230 glider in 1943.

BELOW The target — Scapa Flow was a vital base for the Royal Navy and was accordingly well-protected; note the barrage of flak through which the Mistel would have to fly.



be completely redesigned. In fact, no such modifications were undertaken, and the undercarriage was prone to collapse on take-off. A safe take-off could be attempted only from concrete runways which were considered to be in perfect working order. Even the smallest hole or imperfection on a runway's surface could have dire consequences for the machine and its pilot. Later in the war, operational Mistel were fitted with larger tyres which were rated for weights as high as 23½ tons for take-off. Once in the air, a combination fitted with a warhead was impossible to land, so the only choice left to the pilot in an emergency was to jettison the complete lower component.

Apart from a weak undercarriage, another problem was the time lag between the fighter's pilot operating a control and the autopilot relaying this to the bomber. The Ju 88 always had a tendency to swing on take-off, and this propensity was magnified by the delay in the time needed to correct. It was not unknown for the combination to swerve off the runway on take-off, and it was impossible to fly the Mistel in tight formation owing to the same problem. Despite this, most Mistel pilots found the dual controls easy to handle and responsive — although it was still a daunting machine to have to come to terms with.

GETTING USED TO THE MISTEL

Feldwebel Rudi Riedl was a flying instructor who was assigned to 6./KG 200, a Mistel unit, in late 1944. He recalled his first impressions: "When I saw my first Mistel, which was a training variant,

I thought 'How the hell am I going to handle this monster?' I had to sit in the cockpit for a long time to get a feel for the machine — to understand how it worked and to come to terms with how high up I was. It's a very unusual feeling to be sitting 6m [20ft] above the ground! Eventually, however, after having checked out the instrumentation and controls, I began to realise that perhaps it was not going to be so difficult after all. But when I later saw the operational variant with that warhead mounted, I was absolutely astounded. I thought, 'How am I going to handle this? There is no other crew except me!'"

Riedl made a total of ten training flights, which was considered to be the standard number before embarking on operations. Six of these flights were aiming exercises, in a training variant in which there was a pilot in the Ju 88, following which the complete composite returned to base. The remaining four flights involved separation exercises during which there were occasional accidents. At the moment of separation, the natural inclination of the pilot in the upper component was to push the stick forward causing, on occasion, the propeller blades of the fighter to strike the cockpit of the Ju 88, with often fatal results.

"Starting and taxiing in the Mistel was hard," remembered Riedl. "It was a real beast. Visibility was very restricted. Because of the height and angle at which the machine sat on the ground, you could only see the end of the runway when the tail came up and you were ready to lift off. Also, often when manoeuvring and turning into



the take-off position, the tailwheel was known to come off and that was when there were accidents; machines slewed off the runway. But once the machine was airborne, there was no real problem. A little sluggish perhaps, but that was all. It has to be remembered that we were all experienced pilots — former instructors — not novices. In flight, the Mistel handled comparatively well, very like any other twin-engined bomber. The Junkers technicians who worked on matching the controls of the upper and lower components did a fantastic job.”

MISTEL INTO ACTION

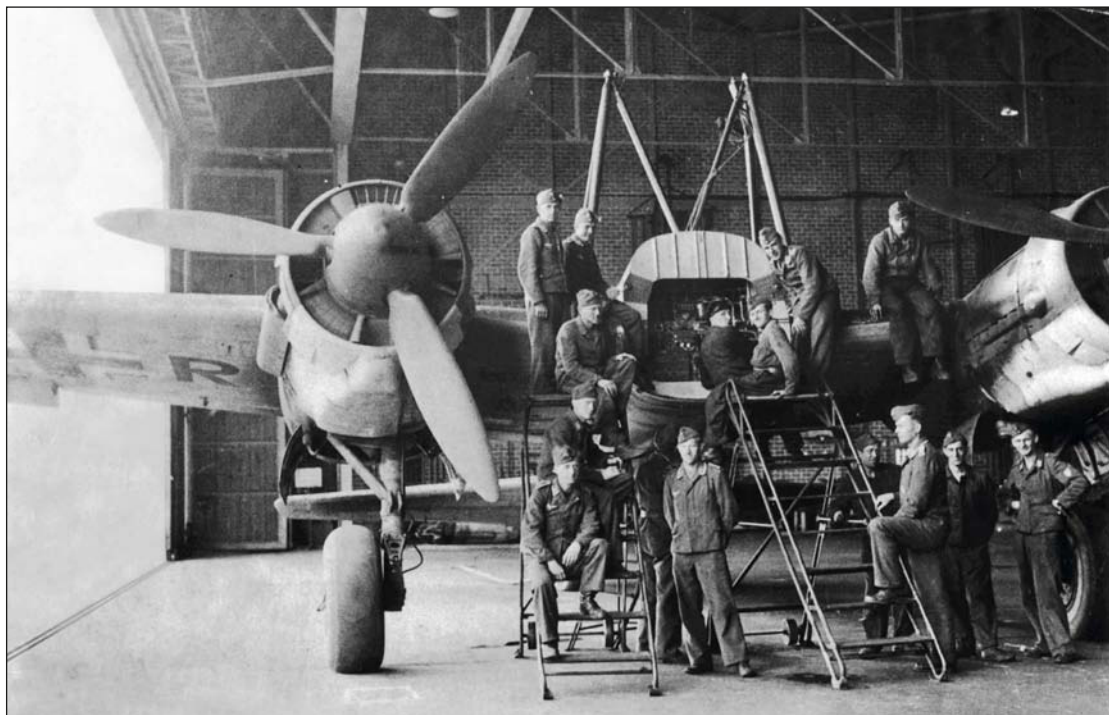
The Mistel was first used operationally to devastating, albeit sporadic, effect in June 1944 when aircraft of 2./KG 101 attacked shipping off the Normandy coast. One Mistel narrowly missed the British frigate *HMS Nith*. One member of the crew remembered that the composite caused “an enormous explosion alongside the ship. Our sea-boat was turned outboard at its davits ready for an emergency and the wing of the plunging aircraft cut the boat in half — which gives some idea of how close the Ju 88 was when it hit the water.”

The Mistel blew in *Nith*’s starboard side amidships, causing it to heel over to port, and the entire length of the ship was raked by steel

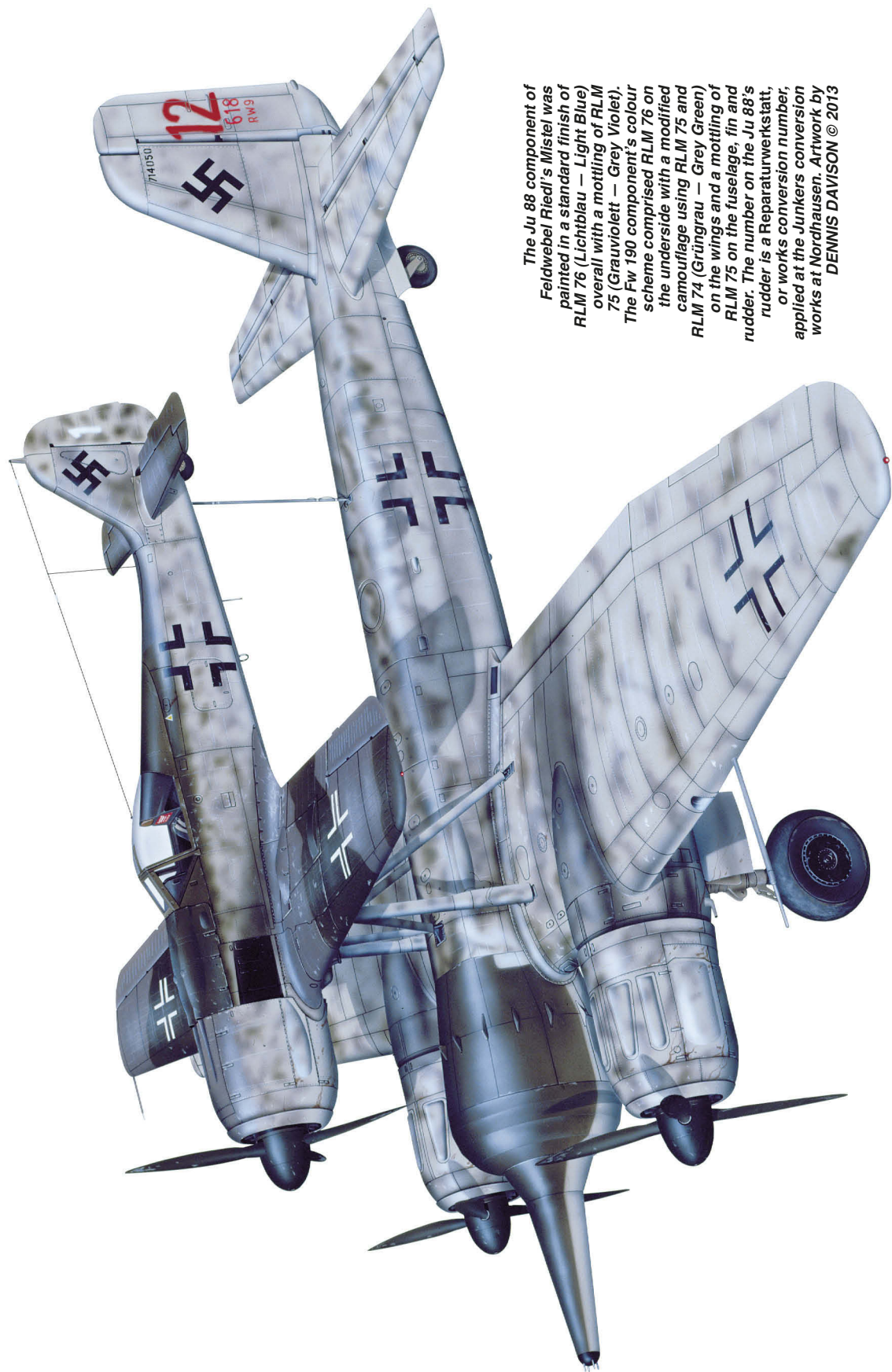
fragments. Steam pipes in the boiler room burst and the main generator was put out of action. For a time, the ship was without electricity. *Nith*’s second-in-command recalled grimly: “I just remember the awful sight of maimed bodies, blood, flesh etc”.

In early 1945, with the military situation facing the Third Reich becoming increasingly precarious, there were fewer and fewer targets at which a Mistel could be launched with any chance of success. In January, *Reichsmarschall* Hermann Goering sought desperately for a high-profile mission opportunity with which he could salvage the Luftwaffe’s reputation before both the Nazi leadership and the German people. The Luftwaffe had failed to push the Allied invasion back into the sea the previous June; it had failed to stop the Allies’ round-the-clock bombing; it had failed to offer adequate cover to German ground forces on both the Western and Eastern fronts throughout 1944 and its promises of new units operating revolutionary jet aircraft had yet to materialise fully.

Goering ordered the *Kommodore* of KG 200, the renowned bomber ace and Knight’s Cross-holder, *Oberst* Werner Baumbach, to make preparations for one of the most audacious operations ever to be considered by the Luftwaffe. The *Reichsmarschall* hankered back to a target which he had



ABOVE Luftwaffe groundcrew, probably of Einsatzgruppe 101, at Burg in the autumn of 1944. The Ju 88 has its nose section removed, exposing the bulkhead to which the hollow-charge warhead would be fitted. Removal of the cockpit and fitting of the warhead took a day and required a team of six mechanics, two armourers and a crane.



The Ju 88 component of Feldwebel Riedl's Mistel was painted in a standard finish of RLM 76 (Lichtblau — Light Blue) overall with a mottling of RLM 75 (Grauviolett — Grey Violet). The Fw 190 component's colour scheme comprised RLM 76 on the underside with a modified camouflage using RLM 75 and RLM 74 (Grüngrau — Grey Green) on the wings and a mottling of RLM 75 on the fuselage, fin and rudder. The number on the Ju 88's rudder is a Reparaturwerkstatt, or works conversion number, applied at the Junkers conversion works at Nordhausen. Artwork by DENNIS DAVISON © 2013



ABOVE Looking like a malevolent shrew, a warhead containing 1,700kg (3,750lb) of explosives is hoisted up by a winch and chains to be fitted to the fuselage bulkhead of a Ju 88. After the warhead was attached the composite was towed to the take-off position as the pilot of the fighter could not operate the brakes of the lower component.

dreamed of attacking en masse at the outbreak of war. At the time his plan had been rejected by Hitler, who feared retaliatory attacks on the Reich as a consequence; but now, with the Mistel, he had the opportunity to launch an attack on the Royal Navy's vital northern base at Scapa Flow in the Orkney Islands. The codename conjured up for the proposed operation was *Drachenhöhle* — "Dragon's Lair".

PREPARATIONS BEGIN

Throughout the latter half of 1944 the big ships of the Royal Navy's Home Fleet regularly passed in and out of Scapa Flow. During June and July, for example, the Fleet aircraft carriers *HMS Victorious*, *Indomitable*, *Implacable*, *Indefatigable*, *Formidable* and *Furious* all passed through there, as did the battleships *Duke of York* and *Howe*.

By February 10, 1945, Baumbach had marshalled the required forces from KG 200 for the attack: 15 Mistel from 6./KG 200 would form the core strike force, supported by 12 Ju 88 and Ju 188 illuminator aircraft from 5./KG 200. On January 12, these machines were ready for transfer to Tirstrup in Denmark from where it was envisaged they could fly the operation at any time from the 20th.

On schedule, 12 Mistel S2 training variants of 6./KG 200 transferred from Burg in central northern Germany to Tirstrup on the morning of

January 12. The day before, Rudi Riedl had been ordered to 7./KG 200's base at Kolberg on the Baltic coast to assist with training; he recalled: "I had just arrived at Kolberg by train when I received a teleprint message ordering me to return as quickly as possible to Burg where I was to collect my aircraft. When I got back to Burg, I was told to fly immediately to Tirstrup for a special operation. The other pilots had already departed. I just had time to pack my private papers and belongings into a suitcase and place them in the safety of the cellar under our barracks. The flight to Tirstrup from Burg took us directly north over Kiel, towards the Danish island of Langeland. As we flew in low over Kiel harbour, we passed some U-boats lying on the surface. Their crews did not recognise the lone Mistel as a friendly aircraft and considered us to be hostile, at which point they began tracking us with their deck-mounted guns. We tried to indicate that we were friendly by wagging our wings, but this seemed to have no effect and, rather worryingly, the guns still followed us. I eventually fired a recognition flare from the cockpit which thankfully seemed to convince them that we were not a 'hostile', but nevertheless it was a hairy moment! Thankfully, we reached Tirstrup in one piece."

When 6./KG 200's aircraft arrived at Tirstrup they were rolled into earth revetments and

THE MISTEL'S SHAPED-CHARGE WARHEAD

THE MISTEL WARHEAD, *Schwere Hohlladung* (SHL) 3500, was developed under great secrecy by the Lauchhammer firm at Riesa some 34 miles (55km) east of Leipzig. It was designed to pierce the armoured steel of a battleship or blow open a wall of reinforced concrete such as that found on heavy gun emplacements, command bunkers, factories and power stations. The 1,700kg (3,750lb) of explosive and detonator for the main charge was placed at the rear of the warhead with a cone-shaped cavity to the front of it, 1.8m (5ft 11in) in diameter. The cone was lined with a layer of soft metal, either aluminium or copper, with four electrical crush fuzes positioned at the tip of a 2.75m (9ft 3in) probe, protruding from the front of the warhead and known as the *Elefantenrüssel* (elephant's trunk). Soft metal was important, since a harder metal would prevent the hollow charge action from functioning properly. When this probe struck the target the fuzes would trigger the detonator behind the explosive charge. The warhead could not be armed until the carrier aircraft's landing flaps had been retracted. This safeguard prevented the warhead from exploding in the event that the upper aircraft was unintentionally separated during an aborted take-off. After firing, the charge — a mixture of 70 per cent Hexogen high-explosive and 30 per cent Trinitrotoluol — would focus all its force on the soft metal liner which then became liquid and projected forward in a fine jet or "slug". Travelling at more than 20 times the speed of sound, the slug could drill a hole through 8m (26ft) of armoured steel or 20m (66ft) of reinforced concrete. Once through the outer layer of a target and subsequently confined within it, the slug of metal would vaporise anything in its path.

The stand-off probe

The length of the probe could be varied to trigger the charge at the optimum distance from the target. When used against armoured steel it could be as long as 2.75m (9ft 3in), but for less well protected targets, the length was considerably shortened and at least three variants of probes, of varying length, are known to have been developed. A stand-off probe was necessary in order to allow time for the soft metal liner to form itself into a thin slug before impact. Broadly speaking, the greater the distance between the charge and the target at detonation, the thinner and deeper the hole drilled; the closer to the target, the wider and shallower the penetration. The entire detonation procedure took place within one ten-thousandth of a second.

Towards the end of 1943, the Luftwaffe *Erprobungsstelle* (Test Centre) at Rechlin arranged for static tests of a hollow charge, similar to the one intended for use on the Mistel, to be conducted against the 25,000-ton French battleship *l'Océan* anchored in the approaches to the naval port of Toulon in southern France. The four-ton charge was directed at the vessel's two main gun turrets. Additional 10cm (4in) steel armour plate had been fitted to the "target" to make it more representative of modern warships. When the charge was detonated, it shot through the additional 10cm armour, through the 30cm (12in) armour of the first gun turret, passing through the turret and out the opposite side, which was of similar thickness, and through the armour plating of the second turret. The result was an effective total penetration of 28m (97ft) into the ship. Other static trials with the hollow charge against structures made of reinforced concrete were undertaken in East Prussia where the warhead blasted its way through some 18m (60ft) of concrete.

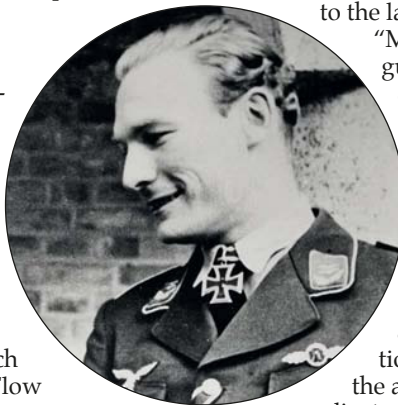
Riedl's Mistel 2, "Red 12", at Tirstrup in Denmark in early 1945. A warhead has been fitted to Ju 88G-1 WNr 714050, suggesting an imminent operation.



camouflaged. Aircrew and staff were quartered in a large, comfortable farmhouse three miles (5km) south-west of the airfield. The same day, in a surprisingly efficient demonstration of logistics, the warheads arrived by train and were fitted immediately to the Ju 88 lower components of the composites.

THE PLAN

Tactically, the plan for *Drachenhöhle* was for the Mistel to fly directly from Denmark, across the North Sea, to Scapa Flow. Riedl recalled: "As far as the Scapa Flow attack plan was concerned, we received only one proper briefing which took place in a large room of the country house near the airfield, in which was a large map of the Scapa Flow area. Each pilot was assigned an individual target since we received regular reconnaissance updates on British shipping movements. I knew exactly where my target ship was anchored. To help us further, at our base at Tirstrup, we had a large, specially-built model of the harbour on which were laid scale models of all the ships known to be there. The real prize was to be assigned an aircraft carrier. It was felt among the pilots that if the Mistel had been introduced earlier and in greater numbers, its effect against certain pinpoint targets, such as ships, could have been far more decisive. Any ship — no matter what size — if hit by a Mistel, would have gone



under. There were to be 12 aircraft — no reserves — and the idea was to fly to the target in cloud so as to minimise the risk of being spotted by British patrols or flak. Fuel for the outward flight would be drawn from the Ju 88 lower components and the amounts required had been calculated down to the last drop.

"Marker buoys had been laid out to guide us in. We were to adopt a line-astern formation. We all wanted the mission to work, because we knew we would be decorated when we got back — there was even talk of the Knight's Cross."

The Mistel were to approach to within 5km (3 miles) of their targets at minimum height to avoid radar detection and then climb to 800m (2,600ft) for target identification. Targets would be selected and the attack would commence as final adjustments were made to the autopilot on the lower components. The pilots would effect separation and launch at 1,600m (5,250ft) from their targets, while in a glide of 20°.

Riedl continued: "Once the attack had been made, the plan was for our Fw 190s to climb as fast as possible to 7,000m [22,965ft] and make for Stavanger in Norway, which was the closest point for a safe landing. Both our forces in Norway and the Navy had been warned to expect us and the Navy had been briefed to watch out for any pilot unable to make it as far as Stavanger and who might have to bale out owing to lack of fuel."

The waiting played on the nerves of the handful

"WE WERE TO ADOPT A LINE-ASTERN FORMATION. WE ALL WANTED THE MISSION TO WORK BECAUSE WE KNEW WE WOULD BE DECORATED WHEN WE GOT BACK . . ."



A Mistel S2 (Fw 190A or F atop a Ju 88G-1, in this case WNr 714533) of 6./KG 200 beside its woodland dispersal site at Tirstrup in the spring of 1945.



INSET OPPOSITE PAGE *Proudly wearing the Knight's Cross, Werner Baumbach (then an Oberleutnant) poses for a propaganda photograph in mid-1940. He would become only the second Luftwaffe bomber pilot to be awarded the Knight's Cross with Oak Leaves and the first to be awarded the Knight's Cross with Oak Leaves and Swords.*

ABOVE *A superb photograph of former Luftwaffe groundcrew at work on the Ju 88G lower component of a captured Mistel belonging to II./KG 200 at Tirstrup in mid-1945. The name Mistel was used possibly because the parasitic plant takes nourishment from its host tree, in the same way the Mistel's upper component took fuel from the lower.*

of pilots. Riedl recalled: "We spent most evenings playing cards . . . we had to have some form of distraction. The long waits and the constant alerts generated a certain restlessness, which was not easily mastered. This, in turn, created a feeling of anxiety, which nobody was prepared to admit for fear of being called a 'scaredy-cat'. So at Tirstrup we all bought walking sticks to play ice hockey on the pond behind the farm at Mollerup where we were quartered. Our puck was a beer can until one of the pilots was struck on the head and suffered concussion. Afterwards we were forbidden to play. But we harboured no grudges — we just needed to ease our thoughts about 'tomorrow'".

MEANWHILE, BACK IN ENGLAND . . .

On February 2, the RAF's specialist Fighter Interception Development Squadron (FIDS), based at Ford in Sussex, was briefed to "patrol to Tirstrup", an airfield which had previously warranted little attention by the Allied air forces. The FIDS despatched two of its de Havilland Mosquito FB.VIs for the task, but they ran into

thick cloud down to sea level off the Danish coast, and approximately 25 miles north-west of Sylt, contact was lost with one machine, which subsequently failed to return.

Another attempt to reach Tirstrup was made during the afternoon of February 9 by a pair of FB.VIs from the Fighter Experimental Flight (Ranger) — FEF — also based at Ford and piloted by New Zealander Fg Off Roy LeLong and Flt Lt Tony Craft. However, the sortie was abandoned, when, once again, cloud brought visibility down to zero feet 3min flying time from the island of Tuno in the Aarhus Bugt.

Like the FIDS, the FEF was one of a number of small semi-autonomous experimental and evaluation units forming part of the Night Fighter Development Wing which, in turn, was a branch of the Central Fighter Establishment (CFE) based at Tangmere. Formed on October 27, 1944, and equipped with the Mosquito FB.VI long-range fighter, the FEF was tasked with conducting deep penetration daylight intruder sorties under cloud cover — codenamed *Day Rangers* — along the



A typically dynamic portrait of a de Havilland Mosquito FB.VI of No 143 Sqn by aviation photography legend Charles E. Brown. The FB.VI was a combination of the F.II fighter variant's airframe fitted with the strengthened wing incorporated into bomber variants of the type, giving the Mosquito the agility of a fighter and the ability to carry a meaningful bombload. This example is seen with wing-mounted rocket projectile (RP) rails, RPs being used to devastating effect by the Banff Strike Wing, of which No 143 Sqn was a part.

Baltic coast or over southern Germany. Sorties were usually despatched to a nominated target — primarily the strafing of airfields using nose-mounted cannon — and on the return home, trains or other transport targets were attacked. No bombs were carried. In February 1945 the unit was led by a highly experienced Canadian, Sqn Ldr Bob “Kipper” Kipp DSO DFC, who had previously flown with No 418 Sqn RCAF.

One member of the unit was Fg Off John Waters, who joined the FEF as a navigator in late 1944; he recalled: “All members of the FEF were experienced and had completed at least one tour of operations — all except me; I was the only ‘sprog’. So I was very lucky to have an experienced pilot from the start. They were all previous members of 418 or 605 Sqn and two pilots from 23 Sqn. I have always assumed that 11 Group was determined to maintain an intruder element of a few experienced crews when 418 and 605 Sqn were posted to 2nd TAF [2nd Tactical Air Force] after D-Day. The full strength was six crews (which we hardly ever were), with replacements ‘as applicable’.”

On February 14 a third sortie was planned for Tirstrup. Once again, Roy LeLong with Fg Off J.A. “Mac” McLaren as navigator, and Craft with Waters as navigator, were picked for the job and at 0840hr their two Mosquito FB.VIs were airborne from Ford. Each aircraft was fitted with four 20mm cannon and four 0.303in Browning guns in the nose. The Mosquitoes flew towards Manston, then set course over the North Sea at “zero feet” and in clear weather with good visibility. Landfall was made at Stadil, north of Ringkøbing, on the west coast of Jutland, followed by another leg, across Jutland, then south to Tuno, where the course was altered for the target. The time was 1056hr.

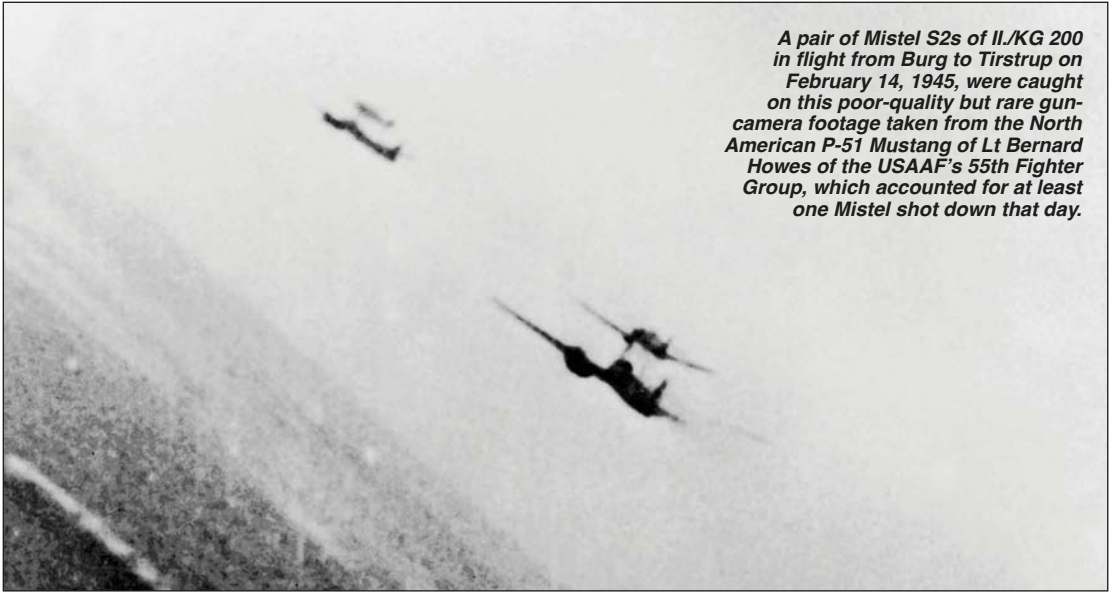
Waters remembered: “Mac’s job was chief



ABOVE Flying Officer John Waters of the Fighter Experimental Flight flew as navigator in one of the Mosquitoes which attacked Tirstrup in February 1945, and was interviewed by the author in 2000.

BELOW A pair of Mosquito FB.VIs of the Fighter Experimental Flight in their revetments at the north-east corner of Ford airfield in Sussex in late 1944.





A pair of Mistel S2s of II./KG 200 in flight from Burg to Tirstrup on February 14, 1945, were caught on this poor-quality but rare gun-camera footage taken from the North American P-51 Mustang of Lt Bernard Howes of the USAAF's 55th Fighter Group, which accounted for at least one Mistel shot down that day.

navigator; mine was second navigator, just to keep a check, but mainly to make sure we were not 'jumped'. We had 50gal droptanks, the fuel from which was siphoned into the wing tanks just before reaching the Danish coast. The pilot then pressed the 'tit' and the tanks dropped off. But there was no such luck for us on this occasion: press as much as Tony Craft could, they refused to drop off and remained firmly secured to the wings throughout the trip! R/T silence was the order of the day, until one reached the target. But on reaching Mariager, Roy LeLong phoned up beseeching my pilot that it would be better 'for God's sake to drop the bloody drop tanks!' — it was a fascinating but short conversation!

"This was a hard winter — ice and snow and floods all added to the excitement of map-reading — and Mac did a good job in finding the airfield so quickly. At least we found it before they found us, and that was very important!"

Shortly before 1110hr, the two Mosquitoes closed in on Tirstrup and commenced their first attack run. Waters continued: "On what I assume was a well-defended airfield such as this, we didn't want to hang around; this attack would have lasted no longer than 1–2min. The whole essence was surprise — hence the low level — and as soon as the Hun gunners got going, we would have cleared off very smartly. I suppose it was like large-calibre clay-pigeon shooting as far as they were concerned, and they were pretty good at it too. Once the flak started, the strict rule was to beat it. There was, very much from the pilot's point of view, an art in strafing; if you came in too low, then you flew through the stuff which the cannon threw up. The four 20mm cannon were not parallel to the fore-and-aft axis of the aircraft — the muzzles were inclined downwards, hence one needed a bit of height for strafing. But if you were too high, your navigator





ABOVE *Fighter variants of the Mosquito were formidably armed, the four 0.303in Browning machine-guns in the nose, together with four 20mm cannon mounted under the cockpit floor, packing quite a punch. This is the Mosquito F.II fighter prototype, W4052, during the making of the 1944 promotional film de Havilland Presents the Mosquito.*

got the twitch because he could see where the flak was coming from — neither very healthy! Since we were following Mac's map-reading, I was 'riding shotgun' and my first view was of an Fw 190 perched on top of a Ju 88."

A RUDE AWAKENING

Down on the ground, the Mistel pilots of 6./KG 200 had left their quarters at Mollerup and were en route to Tirstrup. They had been advised that as a result of improved weather conditions, there was a fair chance that the Scapa Flow sortie might be attempted that day. But as they neared the airfield, they heard the anti-aircraft guns firing. Rudi Riedl recalled: "We had all climbed aboard the Opel Blitz truck as usual for the short journey to Tirstrup. I was wearing all my flying gear ready for flight, including a life vest. We didn't make it as far as the airfield before the RAF arrived. I gazed upwards and saw two twin-engined

fighters approach over the treetops in the distance, then there was one hell of a commotion!"

Roy LeLong described his attack in his combat report: "I approached the aerodrome from the east, the aerodrome being hard to find owing to snow and ice. On approach, I flew parallel to the east-west runway on the south side. At first I could not see any aircraft, but finally saw about 5-6 Fw 190 and Ju 88 pick-a-backs with normal camouflage well dispersed in fir trees. My [gun] sight was u/s [unserviceable], so I used the plate glass for sighting, letting strikes hit the ground in front of one of these pick-a-backs. I pulled the nose up a little and saw many strikes on both the Fw and the Ju 88. Numerous personnel working around these aircraft were scattered by the attack.

"I turned south into the next dispersal bay and made a similar type of attack on another pick-a-back, also seeing strikes. I then turned west and attacked for a second time the first pick-a-back which I had previously damaged. This time both the Ju 88 and Fw 190 burst into flames. After breaking away from this last attack, light flak opened up at me, so we headed for our rendezvous at Mariager. Two columns of black smoke were seen long after the aerodrome was left."

Seconds later, the second Mosquito made its first run. Waters recalled: "We were following — 'hugging the deck' — young Waters busy looking all around to make sure we were not being jumped. But we were just too low on our first run and missed out . . ."

"THE BLOODY GUNS GOT STUCK . . ."

Tony Craft wrote after the sortie: "I approached Tirstrup from the east at zero feet. Flew down east-west runway and saw a Ju 88 painted black, to starboard in a wood to the north of the runway. Before turning starboard in an orbit to

Three Mistel lower components at Tirstrup in mid-1945 after falling into Allied hands. Note that the support struts for the upper component fighters have been left in place. The Ju 88 in the foreground has had British Air Ministry markings applied to its fuselage and tail as well as RAF roundels.



“WHEN THE FLAK OPENED UP I GOT SO EXCITED THAT I GAVE MY PILOT THE GROUND SPEED TO STEER INSTEAD OF THE COMPASS COURSE; TRUE PILOT OFFICER PRUNE”

attack, I saw the Fw 190 and Ju 88 pick-a-back aircraft in flames subsequent to Fg Off LeLong's attack. I then attacked the Ju 88 from east—west and left it in flames (1110 hr). Just after this attack, three light guns opened up at us from west of the aerodrome”.

John Waters: “Tony Craft obviously had a fixation on this black Ju 88 and we were too low to have a go at the ‘pick-a-back’ straight ahead. I think Roy LeLong did three runs and we did two. The Ju 88 would have been nailed on our second run. I can still see those ‘pick-a-back’ aircraft — and remember our frustration when the bloody guns got stuck (we hardly used any ammunition). I can also still see the groundcrews scattering, such was our surprise visit! When the light flak opened up, I suppose I got scared and so excited that I gave my pilot the ground speed to steer instead of the compass course — true inefficiency in the style of Pilot Officer Prune. The result was the two aircraft left the airfield in opposite directions — which I insist foxed those Hun gunners! But once that flak started Roy LeLong phoned us up and we quit immediately.”

Roy LeLong told a newspaper reporter after-

wards: “When we left, the composite and another ‘plane were blazing furiously. We riddled another composite nearby”.

Waters: “We rejoined at the lake at Mariager and returned to base. I have a vivid memory of two men who stopped hoeing in a field — and waved to us — just before we crossed the coast. On arriving home, we taxied to dispersal, stopped the engines, undid our straps, took off our helmets and as I slid out backwards through the door, my pilot let go of the stick which just flopped to one side and lo! — there were two thuds as our two bloody wing tanks dropped to the ground! I quickly darted to our dispersal hut to hear two sergeant ground staff receiving what can only be described as a ‘right good bollocking’ and a lot of nasty threats!”

A POST-WAR CONFESSION?

Although surviving German documents seem ostensibly to attribute the sudden cancellation of the Scapa Flow attack to the juggling of fuel priorities (another operation using Mistel was being planned in the East), the recollections of those who took part in the events of February 14,



Pilots of the FEF line up for a snapshot taken by John Waters at Ford in early 1945. Seen with the Flight's CO, Sqn Ldr Bob Kipp (fifth from left), are three of the four aircrew who took part in the Tirstrup raid of February 14: Flt Lt Tony Craft (furthest left), Fg Off Roy LeLong (fourth from right) and Fg Off “Mac” McLaren (third from right).



ABOVE A Danish officer poses for a photograph in front of a heavily camouflaged Mistel S2 at Tirstrup in June 1945. Note the Ju 88's missing props and spinners, probably removed for spares. Reportedly evidence was found of a plan to build an Fw 190/V1 flying-bomb combination, but it is unlikely this proceeded beyond the proposal stage.

1945, indicate an alternative and more intriguing story. In a revealing post-war testimony, Balduin Pauli, the former *Staffelkapitän* of 6./KG 200, wrote in a letter to former comrades: "After the war, when I met Baumbach in Spain, he said the Reichsmarschall desperately needed a success as a matter of prestige — 'his' Luftwaffe having been discredited — so that he could once again show his face to the Führer. However, in Baumbach's opinion, the mission was not essential to the war effort and, in all probability, we stood to incur a casualty rate of about 80 per cent. So, using certain channels, he had deliberately betrayed the operation".

Precisely what these "certain channels" were remains unknown, but the pattern of events in England in February is also interesting; on the 13th, Sqn Ldr Kipp received a telephone call from Wg Cdr S.N.L. Maude DFC, who worked at HQ Fighter Command at Stanmore. John Waters remembered: "At odd times leading up to the sortie there were scrambled telephone conversations between Maude and Bob Kipp. I have a suspicion that Maude had received information from some intelligence source and then we received our instructions to go to Tirstrup. I'm pretty sure that we aircrew had no idea that we

should find those composite aircraft there — I doubt if Bob Kipp did either, but he might have had some knowledge as a result of those telephone calls".

Surviving documents show that British Intelligence was made aware of Mistel at Tirstrup as early as the end of January. In a report to the Chief of Air Staff from the Assistant Chief of Air Staff (Intelligence), dated February 28, it is stated: "An agent has reported at the end of January and on 19th February that a large quantity of Mistel aircraft have arrived on two airfields in Denmark".

While the betrayal of the operation cannot be confirmed — or denied — with certainty, there is no doubt that it was, once again, postponed. On February 16 the war diary of the Luftwaffe High Command records that: "The Reichsmarschall has decided that Operation *Drachenhöhle* cannot be carried out for the time being".

And so the Royal Navy escaped the Dragon's Lair. But at least one of 6./KG 200's pilots was not so lucky: "Once it was decided to cancel the operation," remembered Rudi Riedl, "we were sent back to Burg. When we got back there, we found that the airfield had been bombed and my suitcase, into which I had earlier placed all my belongings, had been stolen!"





The Alpha Archive is a California-based privately-owned collection of rare and previously unpublished photographs of classic American civil and military aircraft

LEFT Having examined a Bristol F.2B two-seat fighter, the Curtiss Aeroplane & Motor Co of Buffalo, New York, developed an entirely new fighter powered by an equally new American engine. The result was the 1918 Curtiss 18T-1 Wasp triplane (a biplane 18B Hornet was also built), fitted with a 400 h.p. Kirkham K-12 engine. The US Navy received two, as did the Army. This is Navy 18T-1 A3325, also used for Army testing.

RIGHT The Curtiss PW-8 was developed from the R-6 racer that took first and second places in the 1922 Pulitzer Trophy Race. In April 1923 the US Army placed a contract for three XPW-8s to be tested by the Air Service with 440 h.p. Curtiss D-12 engines (developed from the Kirkham engine). The first example was photographed in the snow and displays the radiators mounted as part of the upper wings' skins, as originally fitted to the racer.



LEFT As their D-12 engines tick over, a well-dressed lady watches two PW-8s of the 95th Pursuit Squadron, 1st Pursuit Group, prepare to take off from Selfridge Field, Michigan, in 1925. Despite the type's troublesome wing-mounted brass radiators, which were vulnerable to gunfire from above, Curtiss won a contract to build 25 PW-8s in September 1923. PW-8 24-203 was flown by Lt Russell Maughan on June 23, 1924, during the first dawn-to-dusk crossing of the USA.

american classics



CURTISS INTER-WAR FIGHTERS

from the alpha archive



ABOVE With the introduction of its P-6 series of biplane fighters, Curtiss would finally establish itself as a leading manufacturer of what were designated pursuit aircraft in America at the time. Learning from its previous series of fighters (as well as taking much from those of Boeing), Curtiss created the P-6 series by installing its own 600 h.p. V-1570 Conqueror engine in the same airframe as its successful P-1C. The fourth P-2 (a P-1 with a 500 h.p. Curtiss V-1400 engine), with the serial 25-423, became the prototype XP-6, which is seen here with the insignia of the 17th Pursuit Squadron on the fuselage (obscured by the lower wing) and the designation "Curtiss X-P-6" on the rudder.



ABOVE In June 1930, the first 1925 P-1 airframe (serial 25-410) became the XP-17 when it was fitted with an inverted Wright V-1470 air-cooled engine. One of the very few air-cooled V-12s, the aircraft had a rather awkward cowl to accommodate cooling airflow. Several cowl configurations were tested for the 480 h.p. engine, but the latter was not developed and the XP-17 was scrapped in March 1932. This had not been the first engine change for 25-410, however; in 1926 the airframe had been fitted with an inverted Liberty engine for the Kansas City air races.

the faster skymaster

Looking like a Cessna Skymaster assembled from instructions written in Chinese and translated into English by a Norwegian, the Moynet Jupiter was not the most elegant of aircraft — but it was a performer, its top speed outstripping that of its American rival by some margin. **ROD SIMPSON** takes a look at France's decidedly oddball centreline twin



Resembling an aeronautical version of the Pushmi-pullyu from Hugh Lofting's Doctor Dolittle series of children's books, the Matra-Moynet M.360/6 Jupiter awaits a flight at Paris in July 1965. The unusual engine configuration was initially developed by Claude Dornier and used on the Do 335 Pfeil.

ONE OF THE most iconic — and unusual — German aircraft of World War Two was the Dornier Do 335 Pfeil (Arrow), which introduced the concept of centreline thrust for twin-engined aircraft using a tractor (puller) engine in the nose and a pusher engine in the tail, a concept patented in 1937 by Dr Claude Dornier. Although the Do 335, which entered service in 1945, had little time to prove the advantages of its peculiar “push-pull” layout, there was an undeniable benefit in a system without the asymmetric power problems of an engine mounted separately on each wing, which required a much higher level of piloting skill to keep the aircraft stable should one of the powerplants fail.

The idea of centreline thrust was revived in the late 1950s by American light aircraft manufacturer Cessna, which incorporated the concept into its Model 336 Skymaster, the prototype making its maiden flight on February 28, 1961.

The Skymaster’s unconventional configuration comprised a main fuselage pod with a 195 h.p. Continental engine mounted fore and aft, a fixed undercarriage and twin booms supporting the tail, an added effect of which was protection for the rear propeller.

Cessna subsequently improved the Model 336 as the Model 337 Super Skymaster by fitting a retractable undercarriage and more powerful engines, the company eventually producing a respectable total of 2,500 civil aircraft and 574 military versions.

Enter André Moynet

This development was not lost on French aviator André Moynet, who was watching the growing market for light business twins, thus far dominated by the American manufacturers. Moynet was a former World War Two fighter pilot who had flown for de Gaulle’s Free French Air Force and, later, found himself flying Bell P-39 Airacobras for the Soviet Union on the Eastern Front.





ABOVE Arguably a more elegant way of utilising the twin-engine tractor/pusher configuration was adopted by Cessna with its 336 and 337 Skymaster series, which incorporated a twin-boom layout.



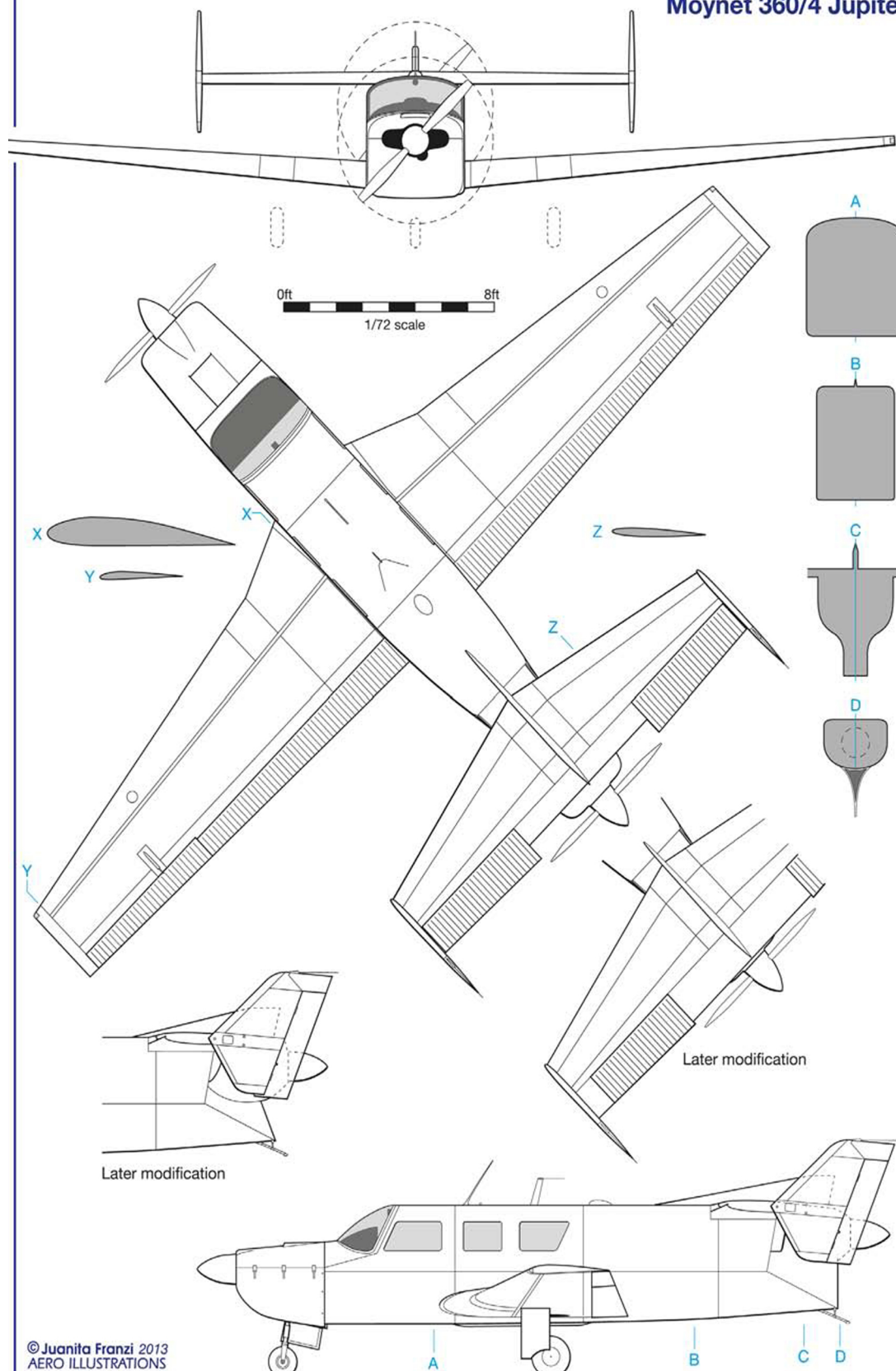
LEFT Born in 1921 André Moynet joined l'Armée de l'Air in 1939, and went on to fly with the Free French forces during World War Two. He also later flew Bell P-39s for the Soviets.

Despite becoming a prominent member of the French National Assembly after the war, Moynet was still keenly interested in aviation and undertook test flying. His first light aircraft design, the Type 57 Jupiter, was a low-wing four-seater with a very streamlined fuselage, a twin-finned tail unit and a pusher 260 h.p. Continental IO-470-D engine at the rear. Although this very attractive machine never flew, Moynet teamed up with Lucien Tielès, a noted engineer who had been at the forefront of several companies including Boisavia and was, by this time, Chief Engineer of Matra (Mécanique Aviation Traction), a company established in 1945 by Marcel Chassagny.

Moynet's new design was for a 4-5-seat light business aircraft using the same centreline power layout as the Skymaster — but offering superior performance. The Moynet 360-4 Jupiter was an

Matra-Moynet Jupiter data

	M.360/4	M.360/6
Dimensions		
Span	36ft 5in (11.10m)	37ft 8in (11.49m)
Length	26ft 9in (8.15m)	28ft 9in (8.77m)
Height	7ft 7in (2.31m)	8ft 1in (2.46m)
Weights		
Empty	2,215lb (1,005kg)	2,950lb (1,338kg)
Max take-off	3,815lb (1,730kg)	5,125lb (2,325kg)
Performance		
Max speed		
at sea level	211 m.p.h. (340km/h)	227 m.p.h. (365km/h)
Max cruising speed	204 m.p.h. (328km/h)	217 m.p.h. (350km/h)
Stall speed	67 m.p.h. (107km/h)	72 m.p.h. (115km/h)
Rate of climb	1,460ft/min (444m/min)	1,400ft/min (430m/min)
Ceiling	22,470ft (6,850m)	23,000ft (7,000m)
Range		
at max cruise	775 miles (1,250km)	1,020 miles (1,640km)





ABOVE Bearing the prototype registration F-WLKE — the W would later be replaced with a B — the M.360/4 is put through its paces by British flight journalist Mark Lambert at the Fête Aérienne at Cannes in the summer of 1964. Lambert found the Jupiter pleasant to fly, despite it being full of test equipment — and noisy — during his test flight.

all-metal aircraft with an unusually boxy fuselage. It had a tapered low wing, retractable tricycle undercarriage and a high-set tailplane with end-plate fins and a central dorsal fin. The new aircraft was powered by a pair of 200 h.p. Lycoming IO-360A engines, fore and aft, driving two-bladed propellers. The cabin incorporated two front seats and a rear bench seat for three or four passengers. Entry was through a door on the starboard side just forward of the wing. The prototype Jupiter (c/n 01, given the civil registration F-WLKE) was built by Matra at a factory provided by Breguet at Villacoublay-Vélizy to the south of Paris and was shown as a static exhibit at the 25th Salon International de l'Aéronautique et de l'Espace in Paris in June 1963.

The prototype's first flight took place on December 17, 1963, at Villacoublay, piloted by Moynet and Tielès, during which it achieved a speed of more than 160kt (186 m.p.h. — 300km/h), which was already faster than Cessna's Skymaster.

Flight testing

The following year it was demonstrated in flight at the Light Aviation Salon at Cannes where it was flight-tested by *Flight* magazine's Mark Lambert, who was impressed by its handling characteristics and compared the interior volume to that of Beechcraft's more conventional Baron (see panel on page 109).

After manufacturer's flight tests the Jupiter was assessed by the Centre d'Essais en Vol (CEV —

The M.360/4 at Le Bourget in 1964 — note how the tandem engine layout pushed the wing well back owing to the rearward shift of the centre of gravity. This placed the front two occupants well clear of the leading edge, giving excellent visibility.





The prototype of the larger M.360/6, F-WLKY in flight. The span was increased by some 15in (0.38m) and the length by 2ft (0.61m). Increased power was provided by a pair of Lycoming IO-540 engines, the cabin (which could be pressurised) having provision for six to seven passengers.

National Flight Test Centre) at Brétigny-sur-Orge, where it again received positive reports. The intention was for the aircraft to be put into production by Sud Aviation — the company was already building the four-seat Gerdan Horizon at Nantes and, in 1965, adopted the Rallye through its acquisition of Morane-Saulnier from Potez, subsequently bringing all its light aircraft activities together under a new umbrella firm, Socata.

Full of promise but no promotion

Despite its success, the Jupiter 360/4 was intended only as a proof-of-concept aircraft for the M.360/6, which was to be the production version. The 360/6 had a longer wing, and a fuselage which was wider and stretched by 2ft 6in (0.77m) to accommodate a third row of seats and increase maximum passenger capacity to seven, with room for baggage in an externally-accessed rear compartment. Engine power was increased by more than 20 per cent by fitting a pair of 290 h.p. Lycoming IO-540 engines with three-bladed propellers. This second aircraft (c/n 03, registered F-WLKY), which made its first flight on May 25, 1965, was built by Matra, which also constructed a static test airframe (c/n 02). Despite the heavier airframe, the extra power gave the M.360/6 a maximum cruising speed of 203kt (234 m.p.h. — 376km/h),

some 26kt faster than the performance eventually achieved by the M.360/4.

Sud-Aviation was initially enthusiastic about the Jupiter and announced that it was also interested in further developments, these including a pressurised-cabin version — the M.360P, with 340 h.p. engines — and a larger pressurised version known as the Présidence, powered by 400 h.p. Lycoming TIGO-541s. Another proposal was for the eight-seat mixed-powerplant Type 2000, with a nose-mounted Turboméca Astazou turboprop and a Pratt & Whitney JT1-12A6 turbojet in the tail.

It is reported that orders for 30 aircraft were placed, including five for the French Government. However, as time went by, interest cooled and, with basic testing completed, the two aircraft languished at Toussus-le-Noble and Les Mureaux. Fortunately, both were saved from destruction and F-BLKE (the W for prototype in the original registration having been replaced by the standard B) now hangs in the *Musée de l'Air et de l'Espace* at Le Bourget in Paris.

The M.360/6, F-BLKY, is at the *Musée Régional de l'Air* at Angers-Marcé in the Loire region. It is under restoration, supported by Matra, with the intention of showing it statically at the 2013 Paris Air Show — and, it is hoped, having it back in the air in 2015. What an exotic prospect!



What was the Jupiter like to fly?

IN THE SUMMER of 1964 *Flight* journalist Mark Lambert was given the opportunity to fly the 360/4 prototype, F-WLKE, with Lucien Tielès during a visit to Cannes. The flight would comprise a climb to 9,000ft,

followed by some stall demonstrations, after which Lambert was encouraged to “play with the Jupiter”. He related in his *In The Air* column in the June 25, 1964, issue, that “the torque reaction from the two propellers is very different because of their respective locations ahead of and behind the airframe, and directional trim changed noticeably with power and speed”. He went on to say that “the torque is no worse than in a fairly high-powered single-engined aeroplane, but a fast-acting trimmer would be convenient”. Lambert was impressed with the Jupiter and remarked that the “immediate handling impression was of a distinctly ‘European’ aeroplane, without control friction or lost motion and excellent response in all axes. Application of rudder produced an immediate and proportional roll response with very little superfluous yaw, so that the Jupiter could be cruised and turned with the feet only”. Lambert reported that the ailerons were light and responsive and produced very little adverse yaw. “I got the distinct impression that the Jupiter had very good and quite normal stability with effective, well-balanced controls, showing virtually no trace of the widely-spaced engines”.

Lambert found visibility ahead from the cockpit poor, however, especially on the final turn for landing “although straight ahead on finals it was adequate”. The landing was straightforward: “Crossing the hedge and flaring at 97 m.p.h. [156km/h] the Jupiter floated a good long way, indicating that a rather lower speed would suffice. When I cut power I needed a fairly extensive nose-up rotation to hold the float level, but elevator control was plentiful and touchdown was simple and smooth”.



Looking here rather like an elongated Piper Comanche with a Lockspeiser Land Development Aircraft parked behind it, the M.360/6 is posed with the M.360/4 for a promotional shot extolling the virtues of the Jupiter as an affordable and versatile executive aircraft. It was not to be, however, and only these two and a static airframe were ever built.

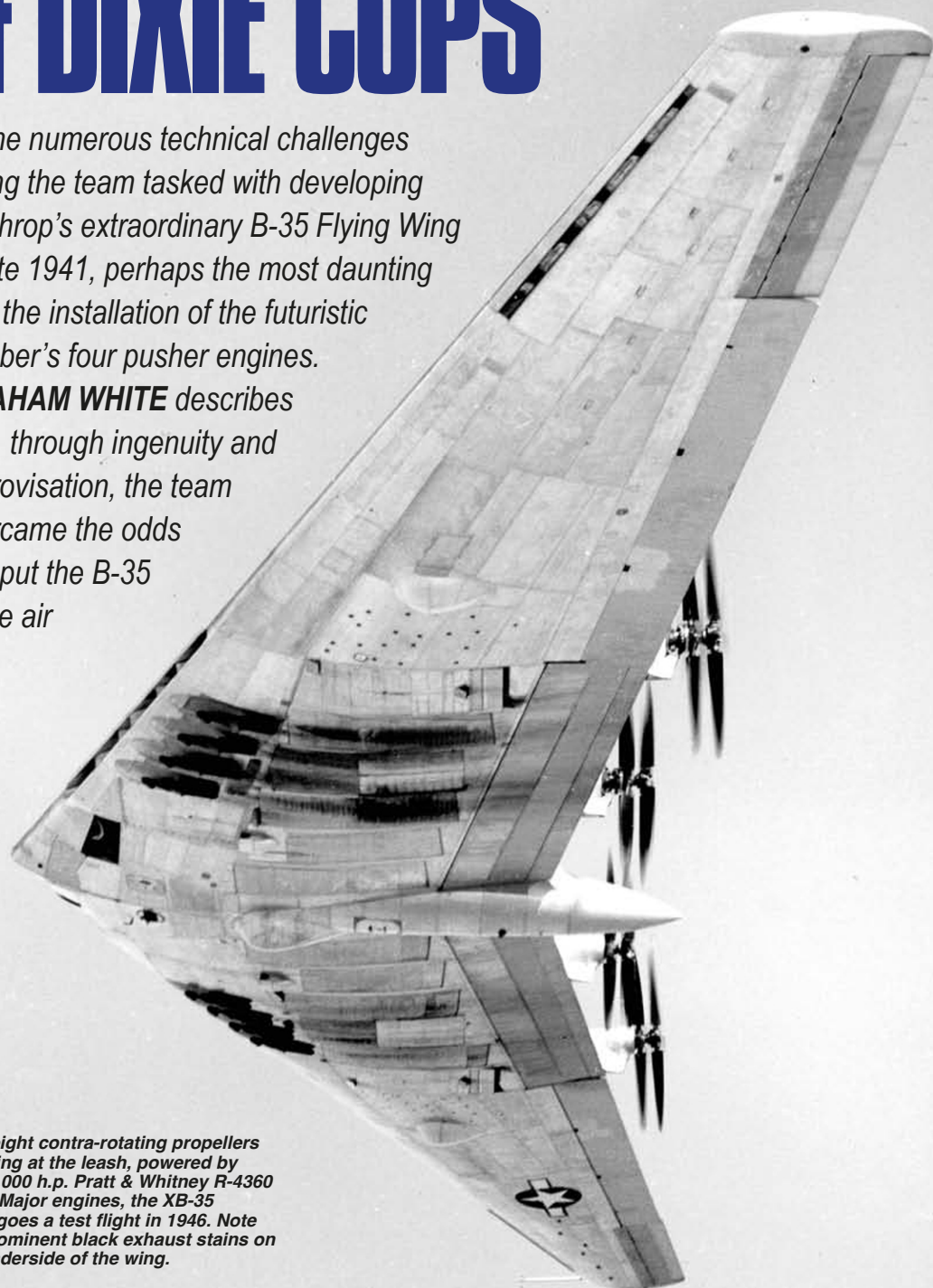


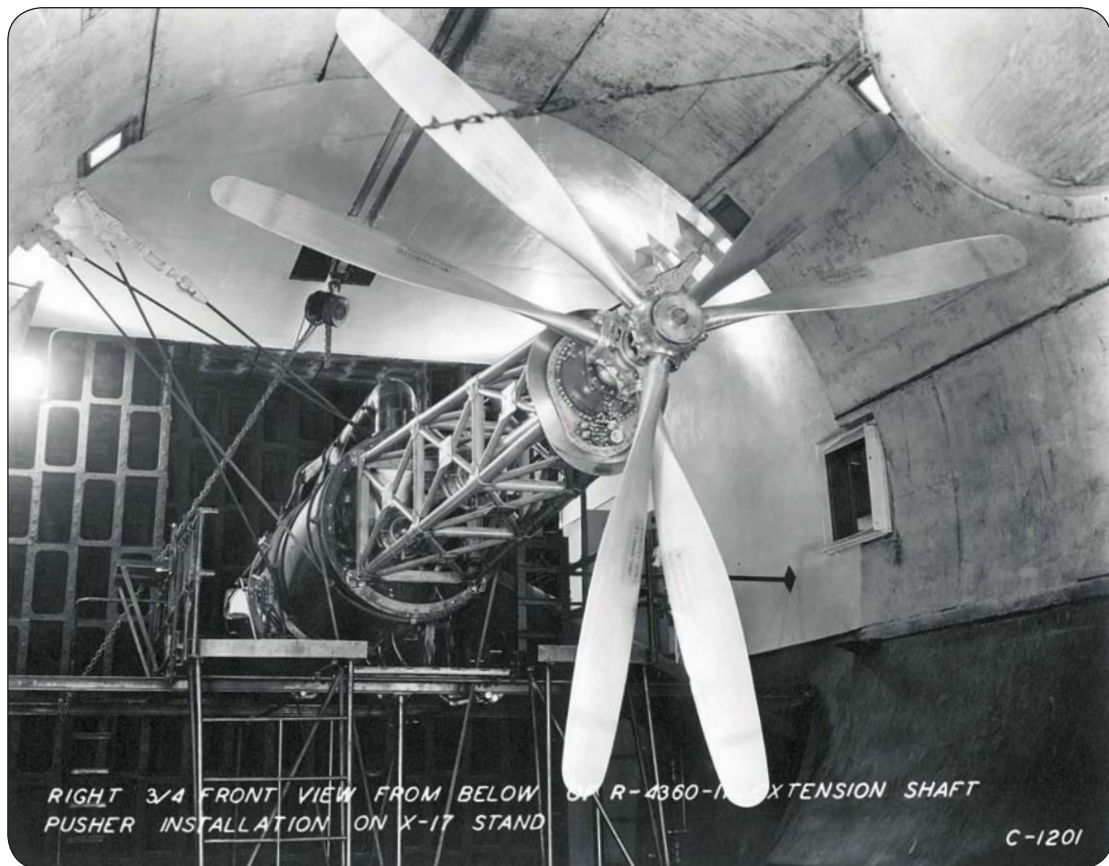
DETERMINATION & DIXIE CUPS

Of the numerous technical challenges facing the team tasked with developing Northrop's extraordinary B-35 Flying Wing in late 1941, perhaps the most daunting was the installation of the futuristic bomber's four pusher engines.

GRAHAM WHITE describes how, through ingenuity and improvisation, the team overcame the odds and put the B-35 in the air

With eight contra-rotating propellers straining at the leash, powered by four 3,000 h.p. Pratt & Whitney R-4360 Wasp Major engines, the XB-35 undergoes a test flight in 1946. Note the prominent black exhaust stains on the underside of the wing.





ALTHOUGH NORTHROP's hugely ambitious experimental XB-35 flying-wing bomber has often been justifiably criticised as a flawed and unsafe aircraft, the engineering concepts embodied within its design, particularly those applied to its powerplant installations, are indeed worthy of praise and a closer look.

Of the 15 airframes built, only the two prototype XB-35s and one of the 13 service trials YB-35s flew with piston power. In addition, two of the YB-35s were converted to jet power to become YB-49s. An incredible amount of time and energy was expended on the B-35 by engine maker Pratt & Whitney (P&W), and yet it is this company that has borne the brunt of unjustified criticism over the years. Despite the fact that so few examples ever made it into the air, in total five different engines were developed for this aircraft.

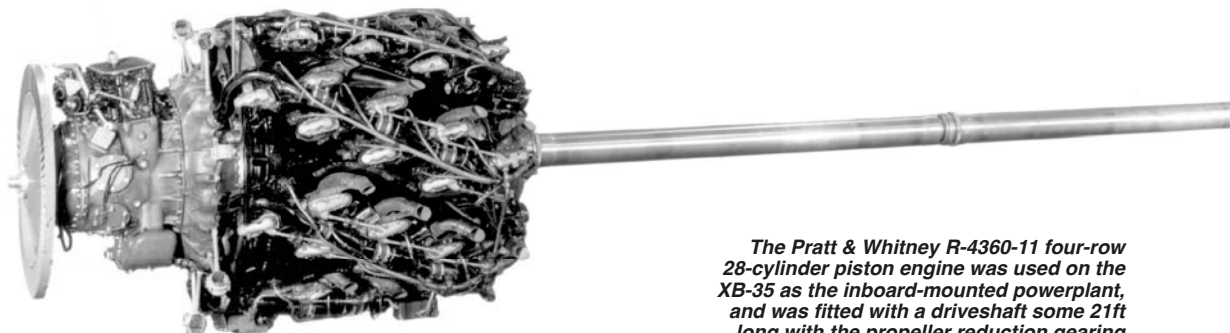
All things considered, the B-35 programme was a terrible waste of resources which accomplished nothing. Arguably it is probably a good thing that so few actually flew: this futuristic-but-flawed bomber was a deathtrap owing to its very limited centre of gravity (c.g.) range, marginal longitudinal stability and a host of other serious control

ABOVE A test rig bearing one of the B-35's R-4360 engines with extension driveshaft connected to a pair of three-bladed contra-rotating propellers. As with Convair's B-36, the B-35's pusher-configuration engines had to be buried in the wing, this type of installation demanding a forced airflow over the engine to augment cooling, particularly on the ground.

problems. Powered by a similar configuration to that used by Convair's equally ambitious XB-36 — a fan-cooled pusher with dual turbosuperchargers for each engine — the B-35 posed daunting engineering challenges for Northrop. Eight turbosuperchargers, four massive air-to-air intercoolers as well as engine oil coolers, induction ram-air and a complex exhaust system had to be mounted in an efficient and lightweight manner.

DAUNTING CHALLENGES

As if this wasn't difficult enough, additional challenges facing Northrop engineers included the mounting of the extension shaft and propeller reduction gear with their attendant oil tanks and oil coolers etc. It would have been considerably easier simply to mount the propeller reduction gearing on the engine in a conventional fashion. The problem with that arrangement would have



The Pratt & Whitney R-4360-11 four-row 28-cylinder piston engine was used on the XB-35 as the inboard-mounted powerplant, and was fitted with a driveshaft some 21ft long with the propeller reduction gearing mounted at its far end.

been an excessively heavy driveshaft owing to the torque multiplication (see panel on page 113). In addition, with more than 3,000 h.p. being transmitted through the reduction gearbox, a considerable amount of heat is generated. Even an efficiency of 95 per cent means that five per cent — or 150 h.p. — in heat needs to be rejected, the majority of this heat having to go into the gearbox oil cooler.

As an example of the desperation facing both Northrop and P&W engineers, the method of lubricating the shaft couplings could only be described as bizarre. A paper Dixie cup (the sort of thing one would drink water or coffee from), filled with 600W oil and loosely capped with a paper top, was inserted into the bearing cavity and the shaft was mechanically sealed. After the driveshaft was installed in the airframe the Dixie cup fell over, allowing the viscous oil to flow out slowly to the appropriate areas. Surviving P&W engineers still enjoy a chuckle over this somewhat primitive lubrication system.

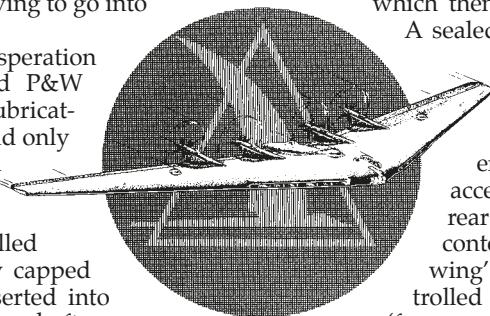
Rarely do you see an accessory on a military aircraft driven by a rubber vee belt. And yet this is what Northrop engineers resorted to for the hydraulic pumps. Of course this may have been replaced by a more substantial gear drive for production aircraft — but maybe not.

COOL IT!

In a similar fashion to those fitted to the B-36, the P&W R-4360 engines buried within the wing of the B-35 required augmented cooling via a sophisticated variable-speed fan arrangement in order to keep engine temperatures under control. Ducts from the wing's leading edge fed air to the fan which then discharged over the engine.

A sealed shroud encasing the engine ensured that all the output from the fan went to cooling the engine.

The hydraulically-driven engine fan was secured to the accessory drivecase at the engine's rear end. However, rear in the B-35 context meant the end facing the wing's leading edge. It was controlled manually by a selector valve (fan-speed control) in accordance with cooling demands by the flight engineer. The fan-drive low-ratio gear was bolted to the rear face of the fan-drive high-ratio gear and this assembly was splined on to the fan-drive shaft. The hub of the high-ratio gear sat against the inner race of the thrust-bearing and was retained in place with a spanner nut. The low-ratio gear meshed with the low-ratio hydraulic coupling fan intermediate drive pinion, and the high-ratio gear meshed with the two high-ratio coupling fan intermediate drive pinions. The cooling fan was bolted to the face of the flanged fan-drive shaft.



Engineers work on the XB-35 at the Northrop factory at Hawthorne, California. With the cancellation of its own proposed super-bomber, the XB-33, in 1942, Martin sent part of its workforce to work on Northrop's ambitious behemoth.

VIA DICK CURTIS



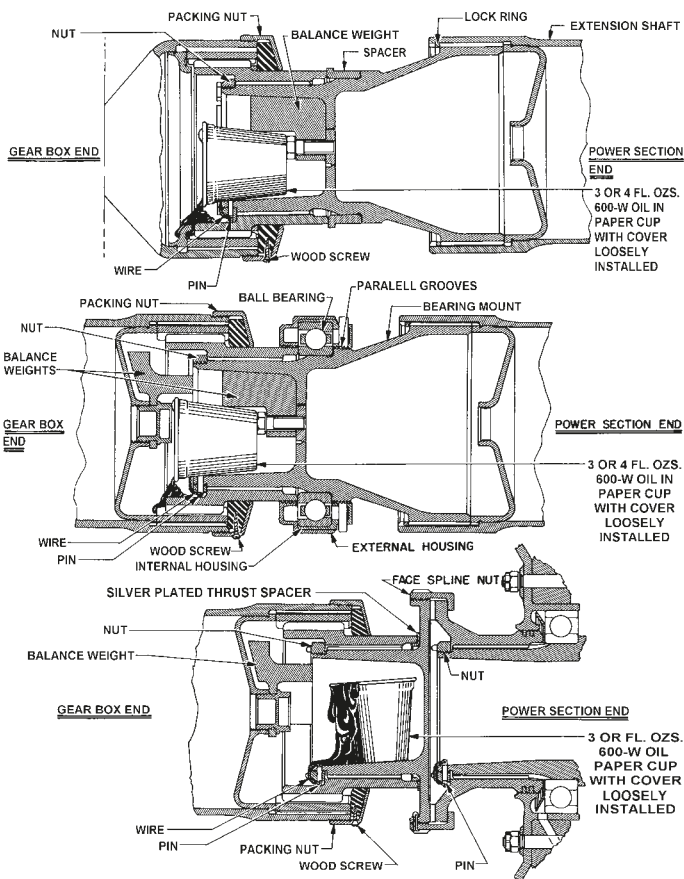


RIGHT The Dixie cup solution — this diagram shows the shaft bearings for the B-35's R-4360 and the position of the cup in each. At top is the bearing at the engine end, the middle diagram shows the bearing midway along the shaft and the lower diagram the bearing at the prop end.

TORQUE MULTIPLICATION & THE B-35

WHEN AN ENGINE'S output is passed through a reduction gearbox, it slows the rotational speed of the shaft but increases the torque or twisting force by the same proportion. This is called torque multiplication.

If the B-35's reduction gearboxes had been mounted on the engines instead of "remotely" at the propeller ends of the drive-shafts, the shafts would have had to be stiffer and therefore much heavier to cope with the increased torque resulting from their reduced rotational speed.



Engine fan speed was controlled by a hydraulic valve actuated by a 28v d.c. reversible motor. This was mounted on the right side of the accessory section of the engine, wired through the engine disconnect box to the flight engineer's junction panel located under the engineer's floor. The hydraulic valve controlled the fluid clutches in the engine. Fan speed control, located on the flight engineer's upper electrical control panel, was via a double-throw momentary toggle switch that was normally in the OFF position. Fan speed could be increased or decreased by the two ON positions designated WARMER and COOLER. When the switch was placed in either of these positions, the circuit to the motor was closed causing the motor to rotate in the appropriate direction to decrease or increase the fan speed respectively.

It should be realised that the cooling fan was capable of a prodigious output, resulting in a significant amount of parasitic power loss because the energy to run it had to come from somewhere — the engine itself. Leading-edge scoops supplied cooling air via ducts to the fan. These leading-edge scoops also provided cooling air for the oil coolers.

TURBOSUPERCHARGER INSTALLATION

Two General Electric CH-1 turbosuperchargers augmented each engine-driven single-stage single-speed supercharger. The two CH-1s operated in parallel. With this arrangement, one turbo could be shut down during cruise conditions. In this way, a single turbo would operate far more efficiently than a pair running in parallel. Part of the rationale for this was the fact that the waste gate would be almost, or completely, closed with a single turbo in operation; whereas, if both turbos were in operation, the exhaust waste gate would open, thus wasting some of the exhaust energy. At the critical altitude for single turbo operation, the other turbo would be brought online to offer greater high-altitude performance. This second turbo could also be brought online below the critical altitude in the event that emergency power was required. A simple butterfly valve closed off the engine's exhaust to one of the turbos when it was not needed.

As with any supercharging arrangement, considerable heat is imparted to the induction air which, of course, is anathema for detonation resis-

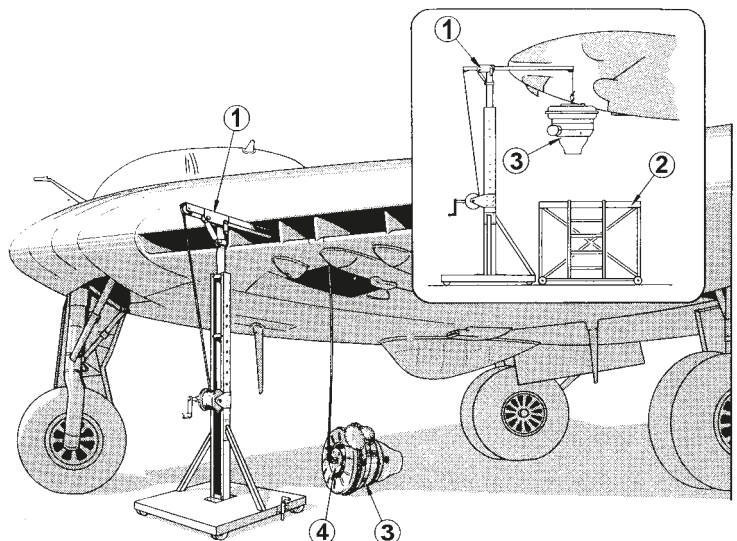
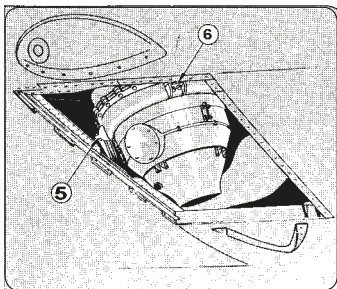
Examples of all three of Northrop's Flying Wings at Muroc (now Edwards AFB) in the California desert. Parked in the shade of the XB-35 is the flying wing proof-of-concept N-9M, with the jet-powered YB-49 making a pass overhead.



tance — the combination of heat and pressure making the fuel/air mixture burn unpredictably and destructively. Excess heat is eliminated via air-to-air heat exchangers. Northrop engineers faced a huge challenge when trying to mount a pair of R-4360s and four massive turbosuperchargers in each wing. The solution was to mount four turbos between the engines on each wing. Each turbo was mounted at approximately 45° with the compressor facing forwards (towards the leading edge). It is worth noting that the B-36 shared a similar powerplant arrangement, but solutions to the engineering challenges made for an interesting contrast; not necessarily better but different.

Installing the CH-1 turbosuperchargers on the B-35 was quite a chore. Mechanics had to insert a crane into the leading-edge air intakes. If the aircraft had entered service, one could just imagine the hangar rash these critical air intakes would have suffered.

A diagram showing the installation of the B-35's CH-1 turbosuperchargers, which would have been a tricky and time-consuming task. The numbered items are: ① turbo hoist; ② Mechanics' stand; ③ CH-1 turbosupercharger; ④ special hoist plate; ⑤ side hanger; ⑥ front hanger



REMOTE PROPELLER REDUCTION GEARBOXES

Mounted on the trailing edge of the wing, the heavy and bulky reduction gearboxes presented another significant design challenge to Northrop's engineers. Two styles were employed; single rotation and dual rotation. Internally, they were similar to the reduction gears employed on R-4360s with integral gearing, the primary difference being the requirement for additional pressure and scavenge pumps for the lubrication system. An oil tank, oil cooler plus ducting and an air scoop for the cooler were required. The dual-rotation gearbox used a pinion and reduction gear and then a Farman-type epicyclic gear to give opposite rotation of the additional propeller shaft. This resulted in the driveshaft being somewhat lower than the pair of co-axial propeller shafts, whereas with the single-rotation gearbox the driveshaft and propeller shaft were co-axial. Therefore it is possible that the single-rotation gearbox was mounted higher in order to maintain the same thrustline. This



The challenge of powering the B-35

The need to bury the B-35's large piston engines deep within the wing near the aircraft's centre of gravity resulted in a system that was inevitably heavy, complex and difficult to access and maintain

Contra-rotating propellers

Cancelled out torque reaction normally associated with a single propeller drive but mechanism was heavy and difficult to cool

Propeller reduction gear

Mounted next to the propeller to keep shaft weight down; cooling was the main problem

Propeller shaft

Necessarily lengthy since engines had to be positioned near aircraft's centre of gravity

R-4360 engine

With 28 cylinders, these large, complex "corn-cob" engines were always a handful to maintain and operate. Their location within the wing compounded those difficulties

Variable-speed fan, engine-driven via fluid couplings

Cooling fan was necessary to cool the engine owing to its position deep within the wing

Intercooler

Cooled the intake air which was heated owing to increased pressure generated by the turbosupercharger. This delayed the onset of detonation

G.E. CH-1 Turbosupercharger

Two for each engine. In cruise flight one could be shut down for more efficient operation. The CH-1s were in a tricky position to install and maintain

Heat from exhaust gases was also bled off for de-icing and cabin heating

Key

Intake air to carburettor and cylinders

Exhaust gases to turbosuper-charger

Cooling air to engine direct from main leading-edge intake



The first YB-35, 42-102366, fitted with single-rotation four-bladed propellers, over the distinctive backdrop of Muroc, where most of the Flying Wing test programme was undertaken. Note the main radar scanner blister atop the centre section and the gun blisters fitted to the outer wings.

small and seemingly insignificant detail illustrates the engineering challenges facing Northrop when the decision was made to change from dual- to single-rotation propellers.

THE EXHAUST SYSTEM

In addition to conveying exhaust gases from the engine, the exhaust system was used to provide motive power for the turbosuperchargers, heat for outer wing anti-icing (outboard engines) and cabin heat (inboard engines). Exhaust gas from each engine was routed through a heat exchanger, diverted into a pair of turbosuperchargers, eventually escaping through an exhaust outlet (flight hood) or waste pipe. As described above, under certain conditions determined by the flight engineer, the exhaust gas could be directed through only one of the two turbosuperchargers.

The heat exchangers worked primarily to lower the temperature of the exhaust gas flowing into the turbosupercharger. At the time of the B-35 project,

high-temperature alloys capable of handling the R-4360's stratospheric exhaust gas temperature had not yet been developed. Neither had an effective way to manufacture internally-cooled turbine buckets. Cool ram-air, after passing through and collecting heat from a heat exchanger, normally discharges into the slipstream through an overboard wastegate assembly; but it could be diverted for use in outer wing anti-icing or cabin heating.

The exhaust pipe coupling in the exhaust port of each cylinder was equipped with a steel liner and four studs for securing to an appropriate exhaust pipe header. These headers were made from stainless steel and encased within removable individually formed cooling shrouds. They were installed somewhat differently on the inboard and outboard engines and, because of the close fitting tolerance necessary, were not ordinarily interchangeable — even from one cylinder configuration to another.

From the headers the exhaust gas was routed into a collector ring similarly encased within cool-

The XB-35 at Hawthorne, still in its original contra-prop configuration. The subsequent jet-powered YB-49 suffered from control problems, and although Jack Northrop's flying wing concept failed to gain traction with the military brass of the time, the idea would resurface some 30 years later.

VIA DICK CURTIS





ing shrouds. On the inboard engines the exhaust gases then passed through a transition chamber directly into the heat exchanger. On the outboard engines the exhaust gases were first routed through a tailpipe. The exhaust pipes aft of the heat exchangers and leading to the turbosuperchargers were also encased in cooling shrouds.

Exhaust gases were dumped overboard under the wing near the leading edge. Pictures from the time of the B-35's test flights show prominent black streaks under the wing owing to exhaust stains.

THE SPIRIT LIVES ON

In summary, the B-35 was a failure. After the expenditure of considerable funds and countless man-hours, the project was cancelled in 1948. Treading new territory is always fraught with difficulties, which in the case of the B-35 proved to be insurmountable with the technology available at the time. It was a brave attempt at something entirely new, and for that Northrop deserves credit.

Further exacerbating the XB-35's technological problems was the political intrigue surrounding it. The first Secretary of the Air Force, W. Stuart Symington, put his faith in the B-36, which sounded the death knell for the B-35. Symington ordered that all the Northrop flying-wings be scrapped, which must have been a painful task for Northrop employees who had poured their heart and soul into the project. The concept would ultimately see fruition several decades later; the B-35 was ahead of its time, but its spirit lives on in the eerie shape of the Northrop Grumman B-2 stealth bomber, which made its first flight in July 1989 and which is still in service today.



ABOVE *The dividend — the Northrop Grumman B-2 Spirit. Reportedly, Jack Northrop, a lifelong advocate of the flying-wing concept, was given clearance to see designs of the B-2 before his death in 1981. Very ill, he wrote on a piece of paper: "Now I know why God has kept me alive for the last 25 years . . ."*

NORTHROP X/YB-35 DATA

Dimensions

Span	172ft	(52.4m)
Sweepback	27°	
Length	53ft 1in	(16.2m)
Height	20ft ¼in	(6.1m)
Wing area	4,500ft²	(418m²)

Weights

Empty		
(with turrets)	91,000lb	(41,277kg)
Gross		
(with turrets)	154,000lb	(69,853kg)

Performance

Max speed		
(projected)	391 m.p.h.	629km/h
Cruise speed	240 m.p.h.	(386km/h)
Service ceiling		
original project	40,000ft	(12,192m)
actual	restricted to 20,000ft	(6,096m)
Range	7,500 miles	(12,070km)

Bomb load 16,000lb (7,257kg) with 7,500-mile (12,070km) range at 183 m.p.h. (295km/h) or 51,070lb with 720-mile (1,159km) range at 240 m.p.h. (386km/h)



Armchair AVIATION

We take a look at what's available for the aviation history enthusiast in the world of books and other literature, from brand-new hot-off-the-press publications to reissued classics

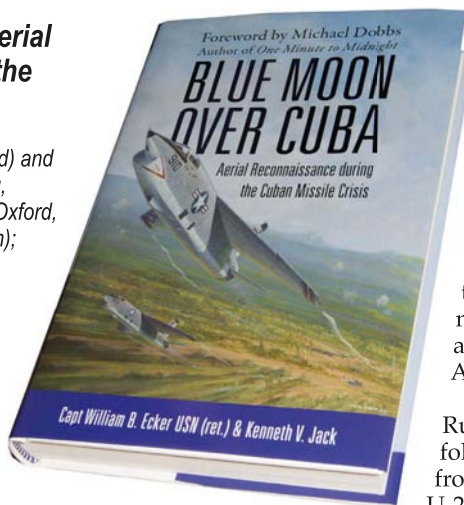
Blue Moon Over Cuba: Aerial Reconnaissance during the Cuban Missile Crisis

By Capt William B. Ecker USN (Retd) and Kenneth V. Jack; Osprey Publishing, Midland House, West Way, Botley, Oxford, OX2 0PH; 9½in x 6in (245 x 152mm); hardback; 287 pages, illustrated; £18.99. ISBN 978-1-78096-071-5

FOR THOSE WHO were not yet born or too young, it may be hard to understand that October and November 1962 were the most frightening and trying times since World War Two. These two months were the closest the world has ever come to nuclear war. American cities ceased their weekly tests of the big yellow sirens mounted atop prominent buildings so that they did not falsely alarm the public below. Neighbours warned their friends to take money from bank accounts and to stock up on canned food.

Although several books have described the political manoeuvrings that generated the crisis, little has been written about the men and machines that "fought" the crisis to a successful conclusion, except in passing mention or in technical, often classified, papers.

This new book is based on the memoir of the recently deceased commanding officer of the US Navy Vought RF-8 Crusader squadron which flew the first productive low-level missions over Cuba, and refined — with material that only personal experience can bring — by a former enlisted technician serving with the squadron at that time. The account combines several viewpoints into a highly readable and creditable story of just exactly how the Navy and Marine Corps aviators and groundcrews contributed to the American response to the Soviets' highly provocative act of placing nuclear-armed missiles a scant 90 miles from the USA.



The book starts with an excellent introduction to the pre-crisis situation, including the disastrous Bay of Pigs operation in April 1961, the first major international test of the new and somewhat naïve Kennedy administration. There is also a description of the first plans of a Vietnam-style "Alpha Strike" against Cuban targets by American naval forces.

A somewhat scary look at the Russian build-up of missile sites follows, as the USA watched from the high-altitude perch of U-2 spyplanes. But more detailed, close-up photography was needed.

The authors describe the heavily restrictive planning that prevented another mission being flown until the Navy convinced the president and his advisers that the RF-8 was the right aircraft for the job. The mire of security and inter-service jealousy almost kept the missions of what would be called *Blue Moon* from happening.

Captain Ecker's memoir of the first mission on October 23, 1962, is heart-pumping stuff, and it forms the basis for the 10min sequence in the 2000 movie *Thirteen Days*, which featured a computer-generated presentation of Ecker and his wingman over the Cuban coastline photographing the surprised Cuban and Russian engineers building their missile sites. The film receives its own treatment in the book and is a welcome addition to the overall discussion.

The authors also touch on the initial failing of the USAF and its McDonnell RF-101s, which were not properly equipped with the right cameras. At one point, the USAF tried bullying the Navy into "sharing" its KA-45 and KA-46 cameras that gave the RF-8A its great reconnaissance capabilities, shooting along the Crusader's flight path. This conflict made for a tragi-comic aspect of the crisis which resulted in Navy and

Marine pilots re-flying several of the USAF's missions. The authors note that the USAF wrote very little about its role in the crisis, although it certainly claimed its share of the glory in *Life* magazine and others.

This new book is very welcome at the time of the 50th anniversary of the crisis, giving an account of those tension-filled days when the world stood so close to the brink of its own destruction. And that's no exaggeration!

PETER B. MERSKY

High-flying Women: A World History of Female Pilots

By Alain Pelletier; Haynes Publishing, Sparkford, Yeovil, Somerset BA22 7JJ; 9½in x 11½in (235mm x 292mm); hardback; 192 pages, illustrated; £25. ISBN 978-0-85733-257-8

THIS VOLUME FIRST appeared in French, but it is good to see an English edition. The author has attempted to recount the lives of all of the "fearless aviatrixes" in aviation history, and to provide detailed biographies of 50 of them. In the restrictive available wordage and pagination this was a bold objective, and it has to be said that the author is only partly successful. The manner in which the book is divided means that one has to search back and forth to cover specific periods, as the chapters are devoted to various types of pilot; pioneers, aerobats, competitors, "shooting stars", glider pilots, long-distance flyers, "fighting women" (which includes accounts of the women pilots of Britain's Air Transport Auxiliary and the USA's Women Airforce Service Pilots) and icons.

It will already be evident that some aviatrixes might belong in more than one chapter, and two other chapters, "Aviatrixes around the world" and "And many others..." reveal the problems of this arrangement. Fortunately there is a good index to help struggling readers, but some women are poorly covered, simply being buried



in listings of names. One such is Hilda Hewlett, who was the first British woman to gain a Royal Aero Club pilot's certificate, taught her son to fly and, with Gustave Blondeau, set up a flying school and then an aircraft factory, but gets a paltry two lines of narrative. The "detailed biographies" are limited to a few hundred words, which permits only the sketchiest outlines of sometimes lengthy careers full of accomplishments.

Pictorially the book is good, with a bountiful collection of

well-reproduced black-and-white and colour images. As a basic quick reference tool this volume might prove handy, but it has limitations.

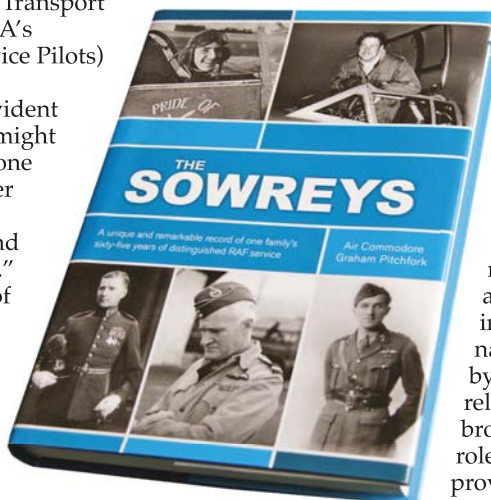
PHILIP JARRETT

The Sowreys: A Unique and Remarkable Record of One Family's 65 Years of Distinguished Service

By Air Cdre Graham Pitchfork RAF (Retd); Grub Street, 4 Rainham Close, London SW11 6SS; 7 in x 9½in (178mm x 248mm) hardback; 240 pages, illustrated; £20. ISBN 978-1-90811-731-1

I WOULD NOT envy any author tasked with combining six biographies in one book, but that is effectively what we have here. The three

brothers John, Fred and William Sowrey all served in the Royal Flying Corps and RAF in the First World War and continued to serve in the inter-war years. Fred won fame by bringing down the Zeppelin L.32 on September 23, 1916, and seems to have been entitled to at least a share of a Gotha bomber shot down on the night of May 19–20, 1918. The accounts of their various careers are interwoven in the chronological narrative, which is greatly enhanced by family correspondence and relevant extracts from archives. The brothers' service in Iraq in various roles during the 1920s and 1930s provides a fascinating insight into the



RAF's activities during this peaceful interregnum, including air policing of belligerent tribesmen and transport ops with Vickers Victorias.

At Cranwell in 1938 a second generation of Sowrey brothers embarked on their RAF careers. One, Jimmy, was shot down and killed, aged only 19, while serving with 73 Sqn in the Western Desert, but John Junior and Freddie saw out the war flying fighter operations in the desert and north-west Europe. Meanwhile William, now an air commodore, was an AOC in East Africa, John senior became a Director of Aeronautical Inspection and a sister, Margaret, joined the WAAFs.

After the war John became a test pilot at Boscombe Down, flying the RAF's latest jets, moved on to fighter squadrons, flying Hawker Hunters, later assumed command of RAF North Luffenham and then became air adviser on the British High Commission staff in New Delhi, India. Freddie also flew fighters, Gloster Meteors and Javelins, as the CO of 615 (Auxiliary) and 46 Sqs respectively. During the Cold War he took up more senior policy and diplomatic posts.

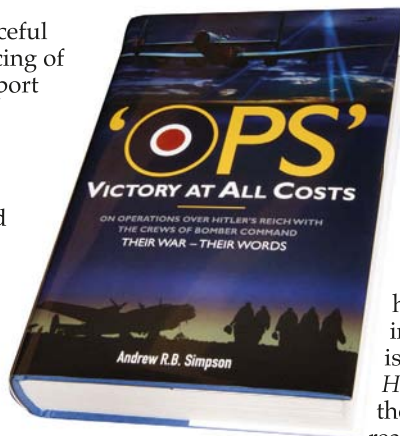
A good collection of black-and-white illustrations are dispersed in the appropriate places among the text (the Royal Aircraft Factory created the S.E.5a, not Sopwith), and anyone interested in the history of the RAF will find much to inform and entertain them here.

PHILIP JARRETT

'Ops': Victory at All Costs

By Andrew R.B. Simpson; Tattered Flag Press, PO Box 2240, Pulborough, West Sussex RH20 9AL; 9½in x 6in (240mm x 160mm) hardback; 472 pages, illustrated; £25; ISBN 978-0-9555977-6-3

WHEN THE BOMBER Command Memorial was unveiled by HM The Queen in London's Green Park in June 2012 a great wrong was, if not righted, at least assuaged. At last the wartime aircrews of the RAF and Commonwealth air forces had been properly honoured, after years of being denigrated or ignored by officialdom. It is a telling fact that, whenever you walk past the magnificent sculpture, housed in its imposing Portland Stone colonnade on the south side of Piccadilly, there always seems to be a significant number of people paying their respects: they care, and they do not forget. Andrew Simpson's



new book, which brings together first-hand recollections of exactly what it was like to fly into war in a bomber during World War Two, is another manifestation of that regard and remembrance; and it has a special added dimension which I will come to shortly.

Before proceeding further, however, we should declare an interest here; the publisher of 'Ops' is a member of *The Aviation Historian's* Editorial Board. I hope, though, that anyone buying or reading the book will have no cause to doubt my impartiality.

On first picking up this thick volume, I immediately wanted to compare it with two books of parallel character about the British Army in the Great War: Lyn Macdonald's 1970s/80s classics *Somme* and *They Called it Passchendaele*. These two, like 'Ops', create a compelling and uncompromising picture of a campaign by using direct quotes from its participants; it is as if the aircrews are talking directly to the reader. Of course there is more to it than simply assembling quotes — the book is carefully structured both "chronologically . . . and thematically", as the author puts it, with the addition of much scene-setting and context in order to create a coherent and self-contained story. Its 21 chapters are grouped into five parts: *First Steps* covers training, *On Squadron* mainly ops (including the thorny matters of morale and Lack of Moral Fibre), *The Chop* being shot down/baling out, *Evasion* what it says on the tin, and *The Camps* life as a PoW. Thus it explores not just the flying experiences, but the aftermath in captivity which was the lot of almost one in 12 bomber aircrew.

Such a structure was to some extent dictated by the "special dimension" to which I referred earlier: the author's father, Laurie Simpson, was a Lancaster pilot who was operational from January 1943, and baled out some 13 months later over northern France. He evaded capture for five days, but was eventually sent to Stalag Luft III at Sagan in Lower Silesia (now part of Poland) and was there when "The Great Escape" took place. Material from his *RAAF Service Diary*, compiled from enlistment in 1941 to the end of the war in May 1945, forms the backbone of the book.

I can find little to criticise other than minor details, such as the glossary entry for ITW, which is surely Initial Training Wing rather than Intensive Training Wing. All in all, 'Ops' is an impressive and valuable piece of work.

MICK OAKEY

Lost & Found

PHILIP JARRETT explores the lesser-known corners of aviation history, discovering unknown images and rediscovering long-lost details of aircraft, people and events

THERE WAS A lot of aviation activity in Kent in the pioneer years, including attempts by amateur constructors to build aeroplanes of their own design.

One of the more obscure “homebuilts” has been known of for some time, but I have been lucky to acquire an original family album containing snapshots of the unfinished machine and a mounted photograph depicting it, for the first time, with its engine installed.

This aircraft was unearthed by the late David Collyer, who researched Kentish aviation for many years. The only photograph to have been published was copied from the album I now own, which belonged to Professor Sir David Smithers. The aircraft has been variously described as the “Langley Smithers”, “Langley-Smithers” and “Langley/Smithers”, but all of these are wrong, as Langley was the builder’s Christian name, not part of his surname. In the July 1987 issue of *Bygone Kent* Collyer quotes Sir David, who recalls:

“The aeroplane was built in 1908, the year I was born, and was the product of my uncle Langley Smithers, who was well known on the Cresta Run in Lord Brabazon’s English teams. I remember the shed on the cricket ground [at Knockholt] (the highest in Kent) ... where they told me that Langley’s aeroplane was built.

“My aunt took a photograph of the partly completed machine in 1909 before it was flown. The aeroplane got off the ground, flying diagonally across the pitch, but crashed on the far side.”

The Smithers family was quite prominent in

Kent at the time. Langley’s father, Alfred Waldron Smithers (1850–1924), was a financier and parliamentarian who joined the Stock Exchange.

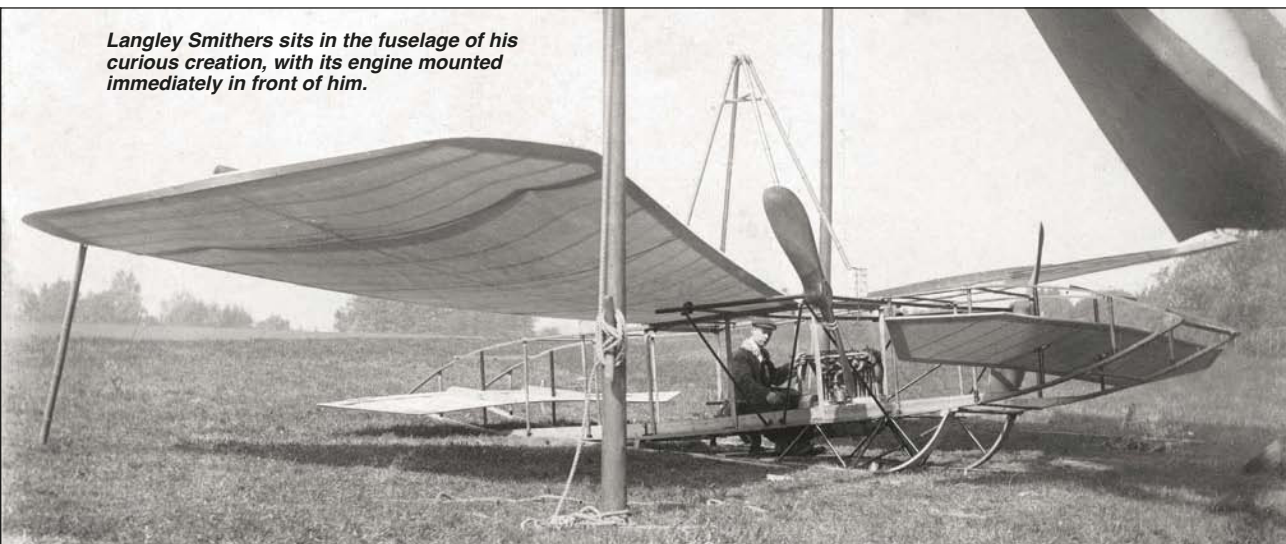
Some basic details of the aircraft may be discerned in the photograph below. A monoplane, its wing was mounted on the top of a broad open-girder fuselage, which tapered to a horizontal wedge at front and rear. The wing had marked dihedral, and was braced by wires attached to an extraordinarily tall pylon comprising four bamboo struts and to the lower fuselage longerons. There appears to be no form of lateral control, though it has been said that wing-warping was provided.

There was a tailplane at the rear and an elevator in the nose, and the pilot’s seat was mounted on the lower longerons, below and between the wings, the centre-section being uncovered. There was no fin or rudder. A skid undercarriage was provided. Twin two-bladed wooden tractor propellers, mounted on a tubular metal outrigger frame, rotated in front of the wing leading edges. The hitherto unpublished cabinet “portrait” of Langley seated in his creation shows an unidentified six-cylinder in-line engine mounted immediately in front of the pilot, but it seems that a radiator and the shaft-and-chain transmission to the propellers have yet to be fitted.

The whole affair looks heavy and impractical, and, given the lack of any vertical surfaces, it is no surprise that it supposedly travelled crabwise across the cricket ground on its one and only “hop”. No published details of this event have yet been found.



Langley Smithers sits in the fuselage of his curious creation, with its engine mounted immediately in front of him.



NEW TRICKS FOR AN OLD SEADOG



Having served as a stalwart carrier-based fighter for the Fleet Air Arm during World War Two, the Fairey Firefly was beginning to show its age by the late 1940s, just as a Swedish target-towing company was assessing the market for a rugged, dependable aircraft to replace its Miles Martinets — enter the Firefly target tug, as JAN FORSGREN recounts

ORIGINALLY DESIGNED AS a two-seat fighter-bomber for the Fleet Air Arm (FAA), the Fairey Firefly entered service during the latter stages of the Second World War. The Firefly quickly established itself as a very versatile aircraft, with more than 1,700 being built in several variants. Fireflies also saw action during the Korean conflict of 1950–53 before being withdrawn from FAA front-line squadrons in 1956. The final use of the type in British service was that of unmanned aerial target.

One role not originally envisaged for the Firefly was that of target tug. Indeed, the thought of converting the aircraft for such a purpose did not originate with the manufacturer, or the FAA, but rather the Swedish company *Svensk Flygtjänst AB* (Swedish Air Services Ltd). The firm had, since 1939, provided target-towing services for the Swedish armed forces, operating a variety of obsolescent aircraft, including Fokker C.Vs and Fiat CR.42s. After the end of the war, a number of Miles Martinets were acquired. However, they

were soon found to suffer from a number of structural deficiencies, as well as a lack of performance. Thus a replacement was sought, with Svensk Flygtjänst approaching Fairey about the viability of converting the Firefly. The requirement was for a two-seat aircraft with relatively high speed, which made the Firefly an obvious candidate.

Enter the Firefly TT.1

Quick to respond to the request, Fairey converted a Firefly FR.1, installing a windmill-operated RFD winch and two target containers, one under each wing. The conversion was designated Firefly TT.1. After successful trials, the first example arrived in Sweden in early 1949. Svensk Flygtjänst was to become a major user of the TT.1, eventually operating some 18, with an additional example being acquired as a spares source.

The aircraft were extensively used, with the fleet accumulating more than 33,000hr in service during 1949–1964. Five were written off in crashes, with a further four being struck off charge following



The first Swedish Firefly TT.1, SE-BRA, alongside SE-BYD during regular maintenance. Designed by Herbert “Charlie” Chaplin, the Firefly had been developed in line with the Fleet Air Arm’s firmly-established belief in the efficacy of a fast two-seat aircraft that combined the fighter and reconnaissance roles, as had its predecessor, Fairey’s Rolls-Royce Merlin-engined Fulmar.

SWEDISH AVIATION HISTORICAL SOCIETY (SAHS)



ABOVE A rare colour air-to-air study of Firefly TT.1 SE-BYD (formerly MB702 in Fleet Air Arm service) low over a misty sea. Note the wing-mounted fuel tanks — originally devised for use on Hawker Sea Hurricanes — which were a standard fit for target-towing operations, as well as the apparatus fitted to the tailplane to avoid tangled cables.

operational accidents. However, the TT.1 was, for the most part, well suited for the particular operational requirements concerned with target towing.

The first batch and “The Bomb”

The first Firefly TT.1 (previously DK609 in FAA service) arrived in Sweden on December 8, 1948, subsequently being registered SE-BRA. A further four were delivered in 1949, with six more arriving the following year. The Fireflies were flown to Sweden, usually via Ringway—Valkenburg—Kastrup—Bromma by British pilots, including Fairey test pilot Peter Twiss. The average cost for each one was £8,000. All of the Fireflies had been bought back by Fairey for onward sale to Sweden.

In comparison with the Saab B 17A, then also used as a target tug by Svensk Flygtjänst, the Firefly TT.1 was considered more cumbersome by its pilots. Owing to the torque of the Rolls-Royce Griffon engine, the aircraft had a tendency to veer or roll to the right on take-off. However, as it was estimated that a towed target had a braking effect of around 500 h.p., the Firefly's 1,750 h.p. Griffon XII engine had a definite edge over the 1,065 h.p. Pratt & Whitney R-1830 Twin Wasp of the B 17A. To increase the range, external underwing tanks containing 45 Imp gal (205lit), originally developed for the Hawker Sea Hurricane, were fitted.

The Saab-developed BT 13 target indicator became standard equipment on the Fireflies, being fitted to the far end of the towing cable. The BT 13, usually referred to as “the Bomb”, had a microphone fitted, which registered the sound impulses from projectiles within a preset target zone. Hits within three different target zones — 4m (13ft), 8m (26ft) and 12m (39ft) respectively — were recorded by the winch operator on an analogue counter. A target winch, identical to the one installed on the Martinet, was fitted to a few of the Firefly TT.1s, including SE-BRD. However, most aircraft had a hydraulic winch-gear fitted, with a tow cable 2,000m (6,560ft) in length. During most sorties, the cable was extended to only 800m (2,625ft). The tow-cable drum was fitted inside the fuselage, in front of the winch operator's seat.

The Fireflies were finished in overall Trainer Yellow, with a reddish-brown anti-glare panel on the top of the engine cowling later being added. Also, a red pennant appeared on the rudder.

The Fireflies were deployed at a number of airfields, including Bromma, Bulltofta, Kallax (Wing F 21), Karlsborg (Wing F 6), Malmslätt (Wing F 3), Midlanda, Norrtälje and Torslanda. Although the intention was to assign specific aircraft to each of the airfields, aircraft were normally rotated owing to maintenance and other issues. During the late

1950s, Svensk Flygtjänst also received a contract to provide target-towing services for the Danish armed forces.

Unofficial modifications

Some of the Fireflies — including SE-BRC, 'BRD and 'CHM — became known unofficially as the "fighters". These aircraft had bigger mainwheels fitted, as well as featuring a smaller windscreen and side windows which made the cockpit canopy appear much smaller. In some flight regimes, visibility was quite poor, which made these examples unpopular among the pilots. However, while based at Gothenburg, SE-BRD was unofficially modified with a newer, larger canopy. After having listened to seemingly endless complaints from the pilots about the canopy, one intrepid mechanic decided to take matters into his own hands. Being aware that one wrecked Firefly had been dumped at Skå Edeby airfield near Stockholm, the mechanic drove there, and, equipped with a hacksaw, proceeded to saw off the entire canopy assembly. Back in Gothenburg, the old canopy was removed, and the new

one fitted. However, it would appear that only the pilots noted the replacement of the canopy. This was highly irregular, with no technical orders regarding the modification of the canopies of the older type having been issued.



Five additional Fireflies were acquired in the mid-1950s, partly as replacements for attrition, with two arriving in 1953, one in 1955 and two in 1956. The 16 aircraft were all registered to Svensk Flygtjänst. In summer 1959 three TT.1s were acquired from the Royal Danish Air Force. Only two of these were taken on charge, the third becoming a source for spares. These aircraft, SE-CHM and 'CHN respectively, were both registered to Kungl. Majt & Kronan (His Majesty's Government), but operated by Svensk Flygtjänst.

Incidents and accidents

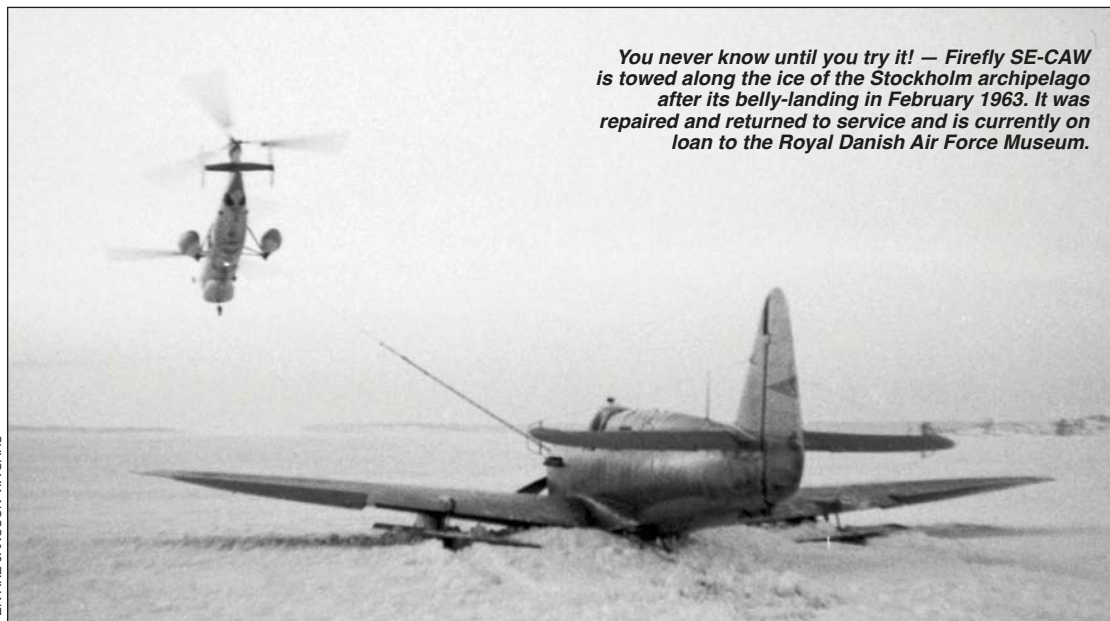
Compared with the Saab B 17A and, later, Douglas AD-4W Skyraiders, the Firefly TT.1 was plagued in service with numerous incidents, with a number of aircraft being written off in crashes. The Griffon XII engines in particular proved troublesome. Although some injuries resulted from a



INSET TOP At least one of the Swedish Fireflies featured nose art, this example showing a cartoon firefly riding a sausage-like BT 13 target indicator; The word *radarkorv*, translated literally, means "radar sausage"! SAHS

ABOVE Svensk Flygtjänst used a number of types for its target-tug operations, including the Pratt & Whitney Twin Wasp-powered Saab B 17, as seen here, and, later, the Douglas Skyraider, an example of which is behind the Saab.

You never know until you try it! — Firefly SE-CAW is towed along the ice of the Stockholm archipelago after its belly-landing in February 1963. It was repaired and returned to service and is currently on loan to the Royal Danish Air Force Museum.



couple of the accidents, nobody — pilot or winch operator — was killed. Nevertheless, the Firefly TT.1 was seen by some as accident-prone, despite the fact that the number of hours flown by the Firefly crews was three times as high as those flown by similar types of aircraft in Flygvapnet (Swedish Air Force) service.

The first total loss occurred on November 26, 1952, when SE-BRK made a heavy landing at F 21 Kallax. On September 18, 1954, SE-BRI crashed when the engine failed at a height of 50m (165ft). The pilot, Torvald Johannes, had to make a forced landing at the nearest available field. Unfortunately, the Firefly hit a stone wall and was completely destroyed by fire. The accidents were not confined to Sweden. During its ferry flight on January 13, 1950, SE-BRF had to make a forced landing near Kastrup, Denmark, owing to poor weather. Although it was

badly damaged when it overturned on landing, it was repaired and subsequently entered service with Svensk Flygtjänst.

Another Firefly, SE-BYD, was badly damaged on a ferry flight to Sweden, when its pilot had to make a forced landing near Meppen in the Netherlands, owing to poor weather and lack of fuel, on November 19, 1953. Following dismantling, 'BYD arrived in Sweden by truck for repairs.

One interesting incident occurred on February 28, 1963, when the pilot of SE-CAW had to forced-land at Staböfjärden in the Stockholm archipelago. After oil covered the windscreen, the engine began to run rough. The pilot had no option but to belly-land on the ice. Apart from a splintered propeller and some damage to the underside of the fuselage, the Firefly was virtually undamaged.

It was subsequently towed to the nearest island

Four of the Swedish Fireflies, the nearest being one of three acquired from the Royal Danish Air Force, in whose colours it is still painted, in 1959. It was subsequently given the Swedish civil registration SE-CHM. SAHS





Firefly SE-BRC (formerly Z1908 in Fleet Air Arm service) at a Swedish airfield in the 1950s, with Saab B 17 SE-BRO in the background. Although the Firefly had a more powerful engine than the Saab, the former was more trouble-prone, the Saab's air-cooled radial proving to be rugged and easy to maintain.

THORE ARDELL VIA SAHS



ABOVE With a typically wintry backdrop Firefly SE-CAU (formerly PP469) awaits another sortie. Following its retirement in 1964 this example was used for firefighting training at Midlanda (now Sundsvall-Härnösand Airport). Its fuselage and centre section are now in Holland, at the Aviodrome Museum in Lelystad, awaiting restoration.

by a Swedish Navy Vertol 44 helicopter. Here, 'CAW' was lifted from the ice and the undercarriage was extended. A new propeller was fitted and, with the oil leak fixed, the Firefly was flown from the temporary icy runway, wheels locked down, to Bromma for further repairs. In the event 'CAW' was returned to service, and, after being withdrawn from use, was selected for preservation.

The last TT.1 loss occurred on September 28, 1963, when SE-BRL ditched off Halmstad following engine failure. The crew, Tage Pallér and Kenneth Sköld, survived, and spent an uncomfortable 25min in the cold water, swimming ashore.

The end of the road

By the early 1960s a replacement was being sought for the Fireflies, which were beginning to show their age, the Griffon engines in particular becoming difficult to maintain. Several types were considered, including the Douglas A/B-26 Invader and another Fairey product, the Gannet. However, surplus FAA AD-4W Skyraiders were eventually acquired, 13 being delivered from 1962.


On October 17, 1963, the Swedish CAA formally grounded all Fireflies. On the same day, the crew of SE-BRD had to make a forced landing at F 6 Karlsborg owing to an oil leak. Following temporary repairs, the crew took off and flew to Torslanda without any problems, being unaware of the order to ground the aircraft.

The aircraft remained stored outside at Torslanda until April 1964, when orders were issued to scrap

the Firefly. Here, fate intervened in the shape of Peter Thomas of Skyfame at Staverton, Gloucestershire, in the UK, who had previously contacted Svensk Flygtjänst regarding the purchase of one of the remaining Fireflies for preservation in Britain.

Of the survivors, SE-BRD was the one offered to Thomas. However, the scrapping had already been initiated, with the winch having been ripped from the fuselage and hanging from a crane. While all this was going on, an office clerk came rushing out on the tarmac, arms flailing wildly, screaming at the top of his lungs to stop. Repairs were initiated, and on May 28, 1964, SE-BRD was flown to the UK for preservation.

For the ferry flight, the registration G-ASTL was issued. The crew for the flight were Tage Pallér and Kenneth Sköld. The aircraft's arrival at Staverton was covered by the BBC. Among the prominent guests present was the head of propeller company Rotol, who, after closely inspecting the prop, remarked, "It really is nice work". Today, the former SE-BRD is on display at the FAA Museum, Yeovil, being finished in its original colours as Z2033, and named *Evelyn Tentions*.

In 2004 two Firefly TT.1s, SE-BRG and SE-CAU, were sold to the Duxford-based Aircraft Restoration Company (ARC) by a private owner. Since then work has been under way at Duxford to return the former SE-BRG to airworthiness. The hulk of SE-CAU has been sold off to a Dutch museum. The sole remaining Firefly TT.1 in Sweden, SE-CAW, was lent in 2006 to the Royal Danish Air Force Museum at Stauning. 



Fairey Fireflies in Svensk Flygtjänst AB service

Registration	Previous identity	c/n	Delivered	Remarks
SE-BRA	DK609	F.7823	8.12.48	Registration cancelled 3.6.64. Scrapped
SE-BRB	DK459	F.7715	12.1.49	Registration cancelled 3.6.64. Scrapped
SE-BRC	Z1908	F.5533	14.1.49	Written off at Rivöfjorden 9.5.60. Recovered, but struck off charge
SE-BRD	Z2033	F.5607	15.2.49	Donated to Skyfame Museum. Registration cancelled 28.5.64. Flown to UK the same day as G-ASTL. Preserved at FAA Museum, Yeovilton, UK as Z2033 "Evelyn Tentions"
SE-BRF	DT986	F.6068	Unknown	Damaged at Kastrup 13.1.50 on delivery flight. Repaired. Written off near Utö on 24.11.54
SE-BRG	DT989	F.6071	28.6.50	Registration cancelled 3.6.64. To Arlanda Collection. Sold to private buyer 1986. To ARC* in 2004. Under restoration to fly
SE-BRH	MB387	F.7379	28.6.50	Registration cancelled 3.6.64. Scrapped
SE-BRI	DV121	F.6090	24.7.50	Written off at Ringenäs on 18.9.54
SE-BRK	MB403	F.7395	24.7.50	Written off at F 21 on 26.11.52
SE-BRL	DT939	F.6033	23.9.50	Ditched off Halmstad on 28.9.63
SE-BRM**	—	—	12.9.50	Damaged in forced landing at Lake Glan 24.1.62. Struck off charge as damaged beyond economical repair
SE-BYB	MB624	F.7560	1953	Written off at F 21 on 15.4.62
SE-BYC	MB728	F.7639	1953	Registration cancelled 3.6.64. Scrapped
SE-BYD	MB702	F.7626	1955	Damaged in forced landing at Meppen, Netherlands, on 19.11.53 on delivery flight. Transported to Sweden by road. Repaired. Registration cancelled 3.6.64. Scrapped
SE-CAU	PP469	F.6180	1956	Registration cancelled 3.6.64. Used at Midlanda airport for firefighting training. Hulk to private owner in 1981. To ARC in 2004. To The Netherlands for static restoration
SE-CAW	PP392	F.6121	1956	Registration cancelled 3.6.64. To Flygvapen Museum. Loaned to Royal Danish Air Force Museum at Stauning in 2006
(SE-CHL)	Z1842,			
	RDAF 625	F.5486?	1959	Not registered. Used for spares
E-CHM	Z1869,			
	DAF 626	F.5486?	8.11.59	Registration cancelled 12.3.63. Scrapped
E-CHN	MB579,			
	DAF 630	F.7534	8.11.59	Registration cancelled 31.1.63. Scrapped

Aircraft Restoration Company, Duxford, UK

* The previous identity of SE-BRM has been erroneously reported as DK671, with the construction number F.7886. The true identity of SE-BRM is still unknown.



EFT Firefly SE-BRF
(originally DT986 in Fleet Air Arm service) after its forced landing at Kastrup on January 13, 1950. It was repaired, only to be written off in another accident near Utö, on November 24, 1954. Unusually, this Firefly appears not to have been fitted with the wing-mounted fuel tanks at the time of the landing accident.

VIA ARLANDA FLYGSAMLINGAR



AUTHOR'S PHOTOGRAPHS

Off the beaten track...

*Ever turned a corner to find something completely unexpected? The Aviation Historian's intrepid aeronautical explorer **PETER DAVISON** investigates the stories behind the oddities that turn up in the most unusual places*

WHEN TRANSPORT aircraft shrug off their service roles and retire to the desert — in this case Davis-Monthan Air Force Base in Arizona — the next step is normally a blowtorch and the scrapman. Not so this Convair T-29B, c/n 329, serial 51-7917. Built at San Diego, California, and delivered to the USAF on August 18, 1953, it served in many roles until arriving at Davis-Monthan for storage on May 5, 1975.

On August 24, 1977, it became one of eight bought by Frigorífico Reyes of Bolivia to carry perishable goods to remote parts of South America from La Paz, the highest international airport in the world at 13,120ft (4,000m) above sea level.

Given the Bolivian civil registration CP-1356, the aircraft was retired in January 1981 and languished at La Paz until 1997, when it was moved to Cochabamba in central Bolivia with the help of the *Fundación Simón L. Patiño* to serve as a children's library. It accommodates a teacher and 20 pupils and sits beside a play area near a busy road junction. At the ripe old age of 60, this much-travelled lady is still earning her keep!



ABOVE Convair T-29B c/n 329 in its current location in a busy town square in Cochabamba, Bolivia, on October 18, 2012. Local enthusiasts see the city as a future home for a Bolivian air museum; perhaps this Convair has booked its place in a Metropolitan Museum. Ouch!

BELOW Another Reyes Convair aircraft was C-131B CP-2026, photographed in apparently airworthy condition at La Paz in late 2012. This machine was formerly 53-7797 with the Arizona National Guard.



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[illegible]

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